From: Whittaker, Laura [laura.whittaker@aptim.com]
Sent: Tuesday, October 30, 2018 9:05 AM
To: Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]
CC: Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Fowler, Janet CIV NAVSEA, SEA 04N [janet.fowler1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Amy Mangel [amy.mangel@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]
Subject: [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY B6 (DC)
Attachments: HPNS APTIM RSY B6 (DC) Soil Non-LLRW Concurrence Request 10302018 (reduc....pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.

LAURA WHITTAKER
Radiological Technician 4 (RCT IV)

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Hunters Point Naval Shipyard, Parcel E-2
RSY Data Report

Contract No. EMAC III CTO-0013		
RSY Pad: B6	RSY Pad Use Number: Deconstruction (DC)	First Submittal ☑ Second Submittal ☐
Data attached and submitted by: Laura Whittaker		Data Report Submittal Date: 10/30/2018

Soil Sample Data					
Sample Identification	Survey Location	Type of Sample	^{226}Ra Final Analytical Results (pCi/g)	^{137}Cs Final Analytical Results (pCi/g)	Total Sr Final Analytical Results (pCi/g)
Upper limit of site reference background			1.633	0.113	0.331
PE2-RSYB6-DC-S001	1	Systematic	0.768	0.0195	-0.00901
PE2-RSYB6-DC-S002	2	Systematic	0.704	-0.00128	N/A
PE2-RSYB6-DC-S003	3	Systematic	0.59	-0.0762	N/A
PE2-RSYB6-DC-S004	4	Systematic	0.477	0.00725	N/A
PE2-RSYB6-DC-S005	5	Systematic	0.690	0.0337	N/A
PE2-RSYB6-DC-S006	6	Systematic	0.787	0.00374	N/A
PE2-RSYB6-DC-S007	7	Systematic	0.677	-0.0228	N/A
PE2-RSYB6-DC-S008	8	Systematic	0.802	0.0245	N/A
PE2-RSYB6-DC-S009	9	Systematic	0.394	0.0254	N/A
PE2-RSYB6-DC-S010	10	Systematic	0.813	0.0346	N/A
PE2-RSYB6-DC-S011	11	Systematic	0.938	-0.0354	0.138
PE2-RSYB6-DC-S012	12	Systematic	0.551	0.0136	N/A
PE2-RSYB6-DC-S013	13	Systematic	0.525	-0.0733	N/A
PE2-RSYB6-DC-S014	14	Systematic	0.625	-0.0393	N/A
PE2-RSYB6-DC-S015	15	Systematic	0.640	0.0218	N/A
PE2-RSYB6-DC-S016	16	Systematic	0.781	0.0385	N/A
PE2-RSYB6-DC-S017	17	Systematic	0.713	-0.0235	N/A
PE2-RSYB6-DC-S018	18	Systematic	0.734	-0.0473	N/A
Biased Soil Sample Data					
PE2-RSYB6-DC-B-S001	1	Biased	0.628	-0.0536	-0.0276
PE2-RSYB6-DC-B-S002	2	Biased	0.751	-0.0758	N/A
PE2-RSYB6-DC-B-S003	3	Biased	0.634	0.0153	N/A
PE2-RSYB6-DC-B-S004	4	Biased	0.675	0.0270	N/A
PE2-RSYB6-DC-B-S005	5	Biased	0.909	-0.0513	N/A
PE2-RSYB6-DC-B-S006	6	Biased	0.556	-0.0357	N/A
PE2-RSYB6-DC-B-S007	7	Biased	0.861	-0.0578	N/A

^{226}Ra Radium-226
^{137}Cs Cesium-137
Sr Strontium
pCi/g Picocuries per gram

Instrument and Survey Data										
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #	Reference Area Static Bkgd	Reference Area Static 3σ IL	Reference Area Scan Bkgd	Reference Area Scan 3σ IL	Range
RSI Gamma Walkover Survey	HPRS-08282018-PE2-ROV2-2940	08/28/2018	RS-701/ RSX-1	N/A	Console: 7236 Detectors: 5447,5448	N/A	N/A	3,400 CPS	4,842 CPS	3,438-**4,903**$^{+}$ CPS
RSI Follow-up Static Survey	HPRS-09042018-PE2-JSS2-2952	09/04/2018	RS-701/ RSX-1	N/A	Console: 7236 Detectors: 5447,5448	3,612 CPS	4,255 CPS	N/A	N/A	3,896-**4,885**$^{+}$ CPS
Systematic Sample Survey	HPRS-08272018-PE2-JSS-2942	08/27/2018	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	**17,572-19,223**$^{+}$ CPM
Biased Sample Survey	HPRS-09132018-PE2-JSS-2969	09/13/2018	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	**19,193-19,650**$^{+}$ CPM

$^{+}$ Gamma readings exceeding the Reference Area 3σ IL are attributable to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil—see Note(s) in the Summary table (page 2) for more details.

3σ IL Investigation Level (established at 3σ above the mean of the Reference Area dataset)

CPS Counts per second

CPM Counts per minute

Summary
1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).
2) RSI Follow-up static survey—26 locations identified during the data review process were investigated. 14 follow-up locations exceeded the Reference Area static IL for regions of interests (ROIs) 6, 7, and/or 8 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7). Note: Gamma readings reported in the Instrument and Survey Data table (page 1) for the gamma walkover and follow-up static surveys show the mean gamma gross count rate range(ROI 10, VD1) for all surveyed follow-up locations. Spectral analysis results show 14 follow-up locations exceeded the Reference Area Static IL for regions of interests (ROI) 6, 7, and/or 8. Biased samples were collected at seven representative locations to support the evaluation of the elevated gamma readings. Biased soil samples PE2-RSYB6-DC-B-S001-PE2-RSYB6-DC-B-S007 were collected and submitted for gamma spectroscopy analysis to further characterize the elevated soil readings at follow-up locations 1, 6, 10, 11, 12, 20, and 21 (see Summary Note 4 below).
3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 38-61). Ten percent of the systematic and biased soil samples (three samples in total, PE2-RSYB6-DC-S001, PE2-RSYB6-DC-S011, & PE2-RSYB6-DC-B-S001) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 38-61 & 62-78).
4) Biased sample survey—samples PE2-RSYB6-DC-B-S001-PE2-RSYB6-DC-B-S007 were obtained and analyzed to support the evaluation of elevated gamma readings collected at follow-up locations 1, 6, 10, 11, 12, 20, and 21. Biased soil sample location are shown on the Biased Sample Survey map (page 9). TestAmerica sample results are attached (pages 62-78). Note: Static gamma measurements collected at systematic and biased sample locations were obtained with a handheld Ludlum 2221 Scaler/Ratemeter and 3"x3" NaI probe; the results show gamma readings exceeding the instrument-specific Reference Area Static IL at several sample locations. Sample results indicate that this activity is due to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil.
Conclusions: **All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 26 locations were investigated during the follow-up static survey, with 14 readings greater than the Reference Area static IL. Biased soil samples were collected at seven representative follow-up locations to support the evaluation of elevated gamma readings. Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 10-35).** **Final analytical results for systematic and biased samples from this RSY pad are concluded to be comparable to background. Histograms showing systematic soil sample activity concentrations are provided (pages 36-37). Ten percent of the systematic and biased soil samples (three samples in total, PE2-RSYB6-DC-S001, PE2-RSYB6-DC-S011 & PE2-RSYB6-DC-B-S001) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1).** **This data package characterizes the construction base layer for RSY B6 pad. The soil was initially import clean material.** **APTIM request RASO concurrence to release this soil as Non-LLRW.** **Disposition: This soil shall be dispositioned as non-LLRW waste. The soil will be stockpiled onsite for reuse following appropriate chemical characterization.**

RSI Data Evaluation Process

RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAsssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review**: The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review**: The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs**:
    - **Z-Scores**: The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three (Z>3) is marked for follow-up.
    - **Local Z-Scores**: Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local Z>3 is marked for follow-up.
    - **Semi-local Z-Scores**: Semi- local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local Z>3 is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
    - Z-Scores: The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a Z>3 is marked for follow-up.
    - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local Z>3 is marked for follow-up.
    - Semi-local Z-Scores: Semi- local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local Z>3 is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
  - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a Z>3 is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local Z>3 is marked for follow-up.
  - Semi-local Z-Scores: Semi- local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local Z>3 is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
  - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a Z>3 is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local Z>3 is marked for follow-up.
  - Semi-local Z-Scores: Semi- local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local Z>3 is marked for follow-up.

- **Z-Score Time Series Review**: The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score > 3 in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

Where:

$$L_C = 2.33\sqrt{B}$$

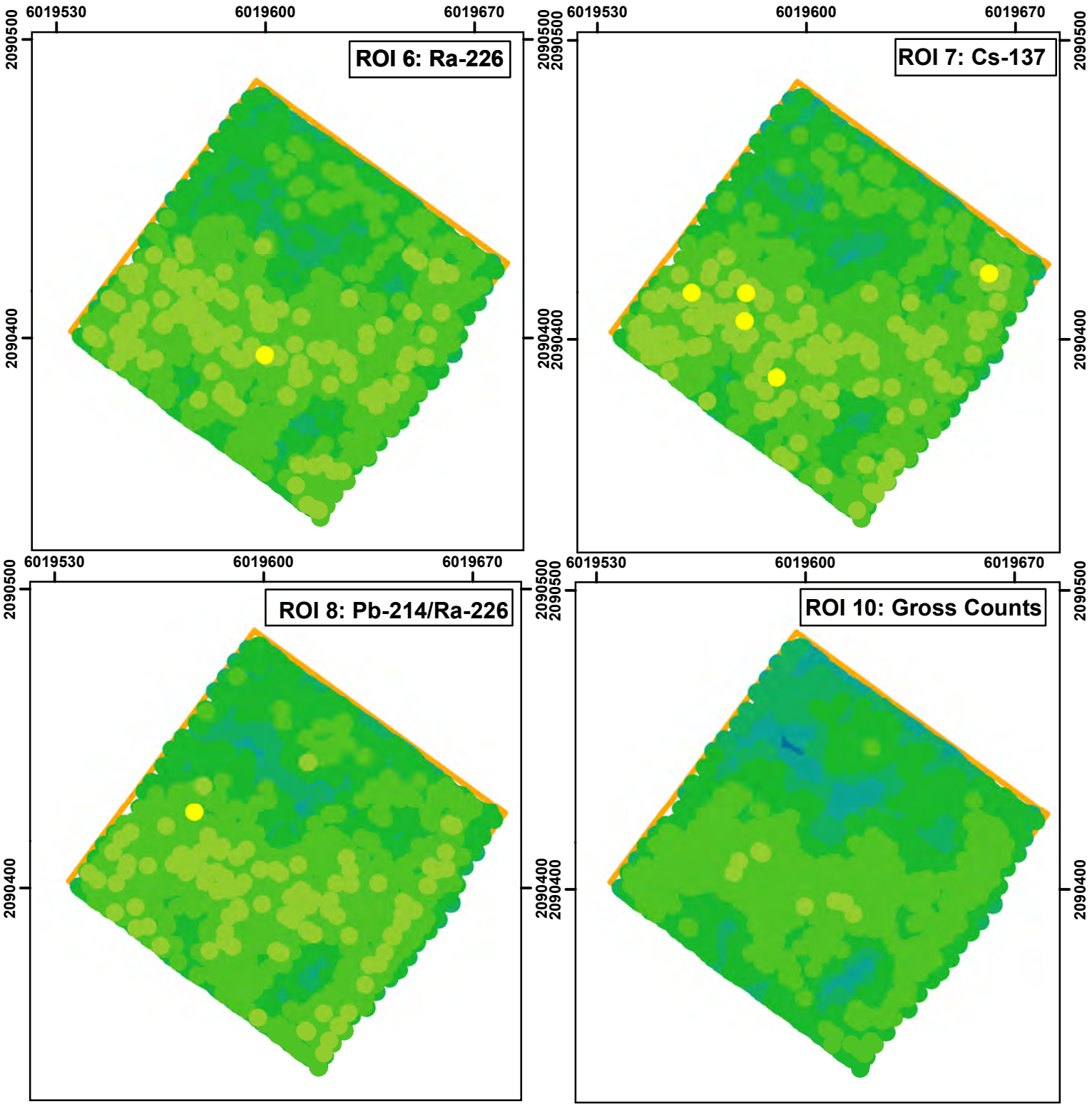
LC	=	critical level (counts)
B	=	average background in the ROI

When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

RSI Data Plots
HPNS Parcel E-2
RSY Pad B6 Deconstruction

Contour Map



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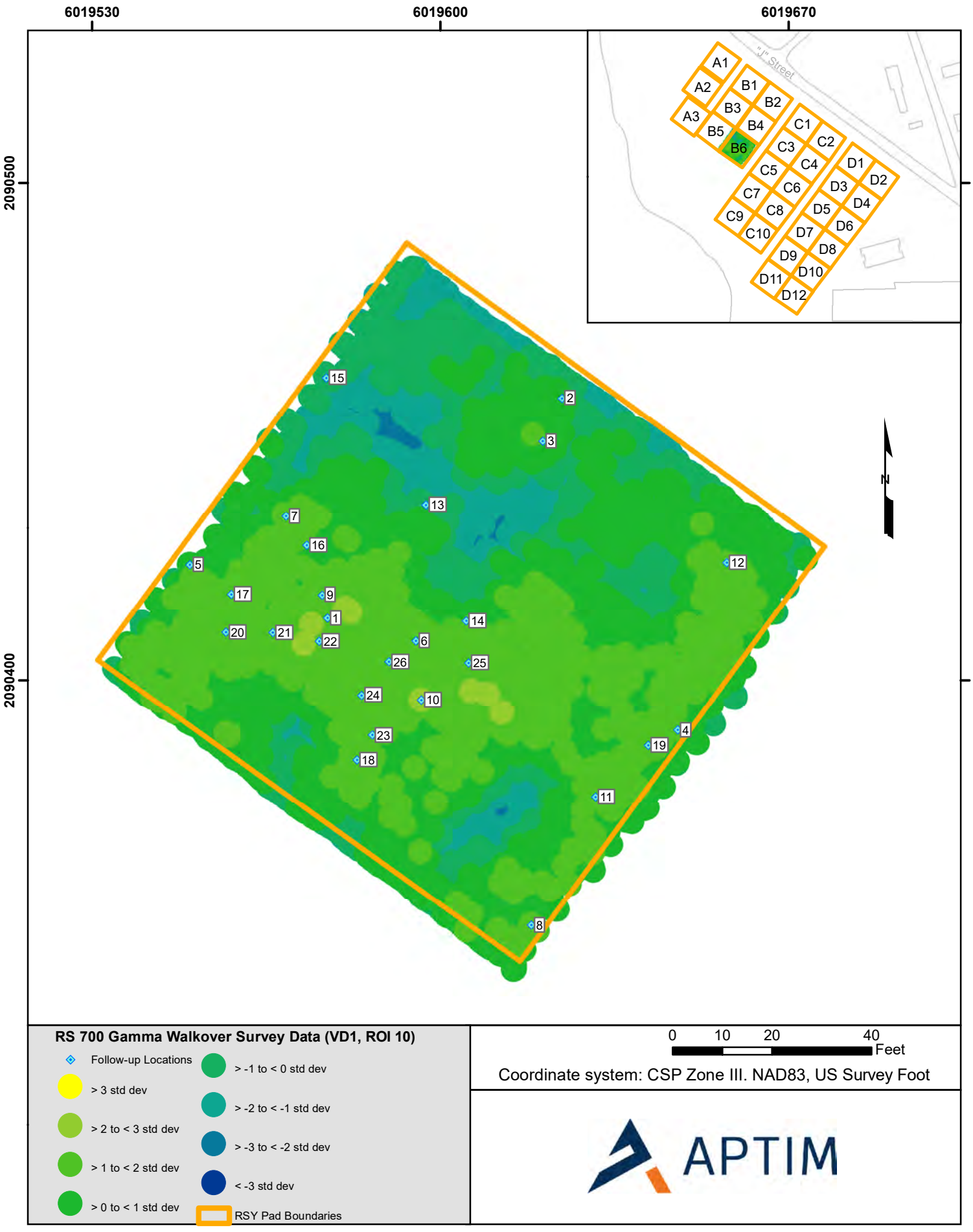
RSI Review Summary

Summary:

26 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on 14 gamma static data locations exceeded the Reference Area Static IL for region of interest (ROIs) 6, 7, and/or 8. All other gamma static readings at follow-up locations were less than the Reference Area static IL for ROIs 3, 6, 7, and 8; figures for all locations are provided on pages 10-35.

RSI Follow-up Static Survey
HPRS-09042018-PE2-JSS2-2952

HPNS Parcel E-2
RSY Pad B6 (DC)



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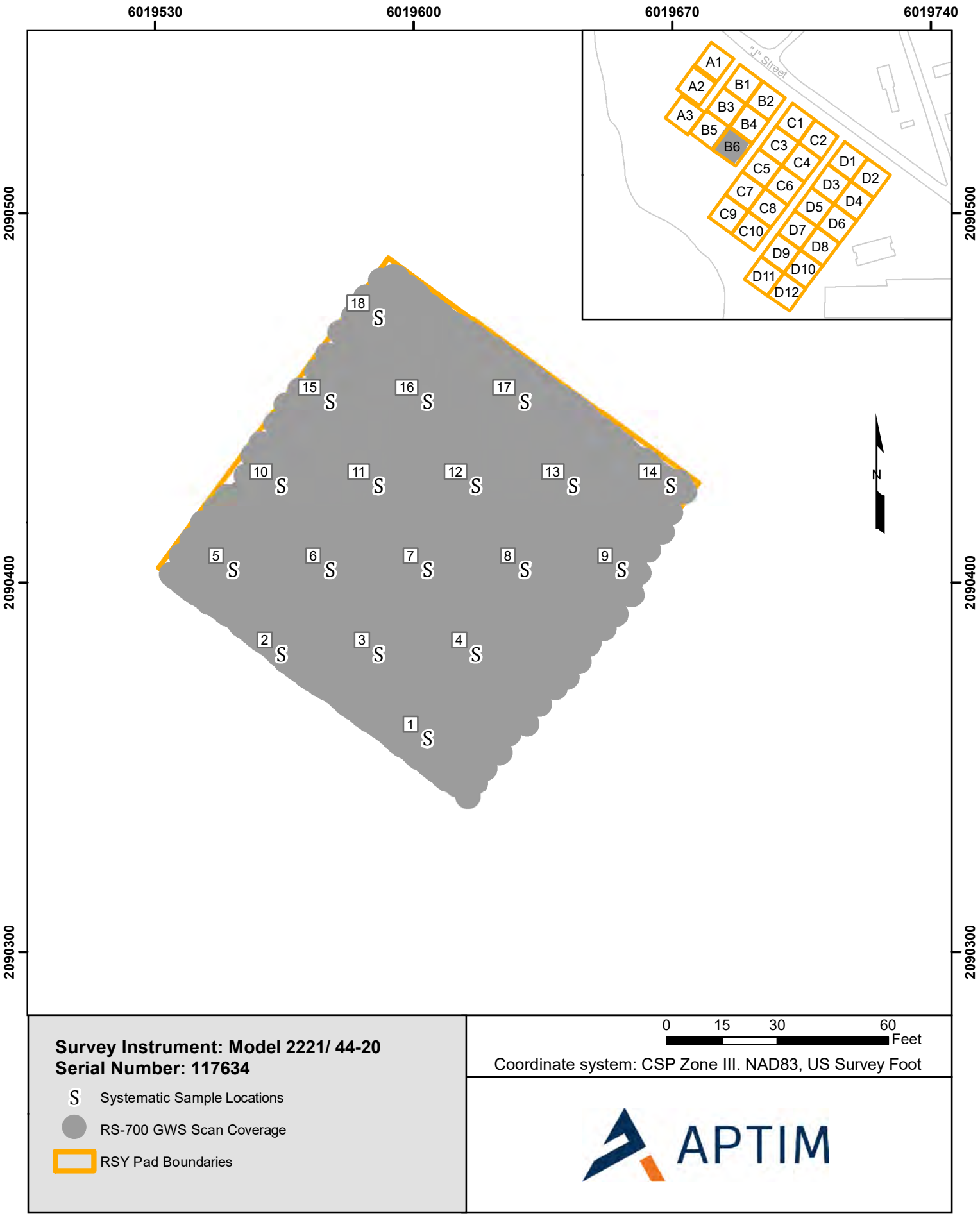
Systematic Sample Survey
HPRS-08272018-PE2-JSS-2942

HPNS Parcel E-2
RSY Pad B6-DC



Survey Instrument: Model 2221/ 44-20
Serial Number: 117634

S Systematic Sample Locations

RS-700 GWS Scan Coverage

RSY Pad Boundaries

Coordinate system: CSP Zone III. NAD83, US Survey Foot

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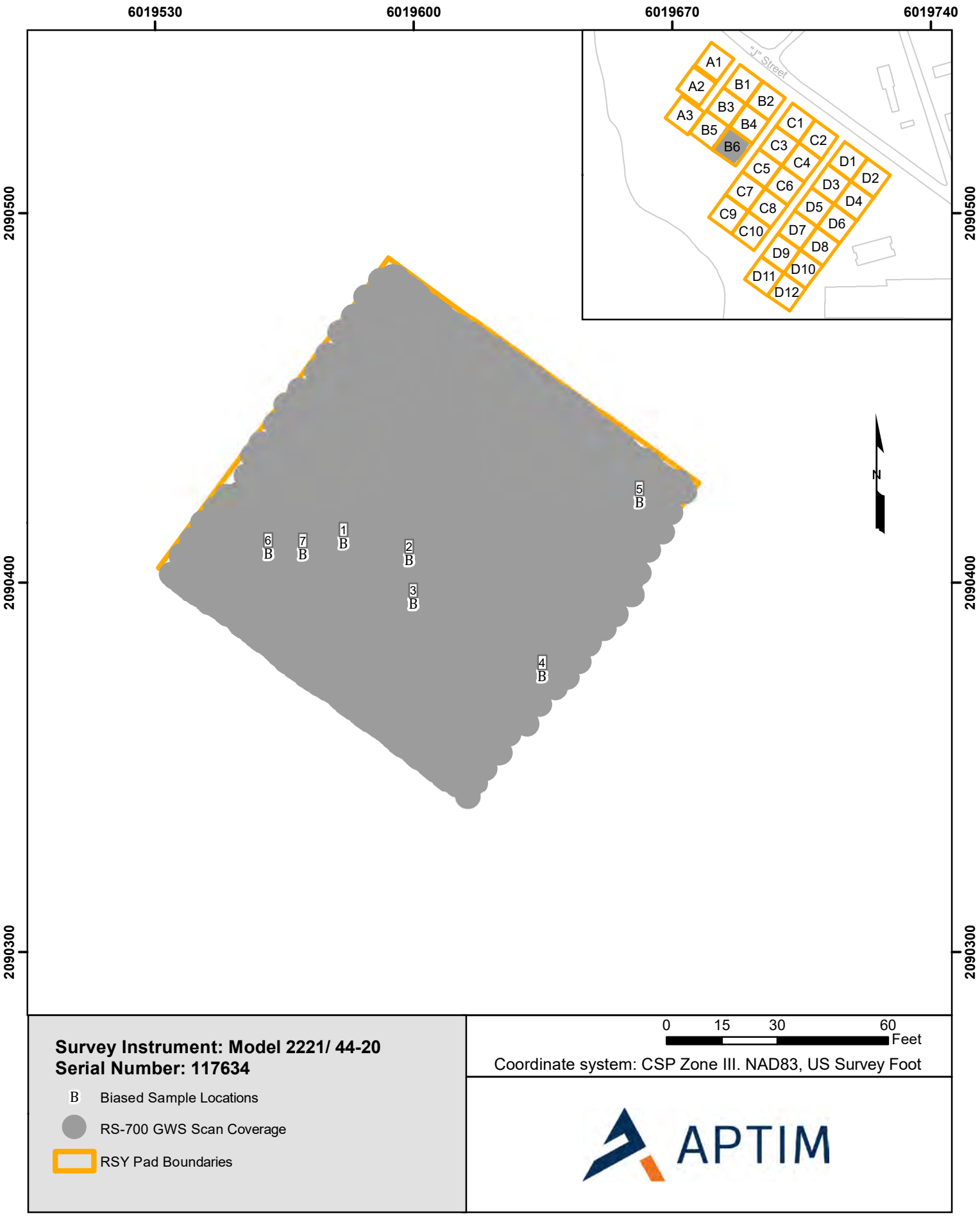
Biased Sample Survey
HPRS-09132018-PE2-JSS-2969

HPNS Parcel E-2
RSY Pad B6-DC



Survey Instrument: Model 2221/ 44-20
Serial Number: 117634

B Biased Sample Locations

RS-700 GWS Scan Coverage

RSY Pad Boundaries

Coordinate system: CSP Zone III. NAD83, US Survey Foot

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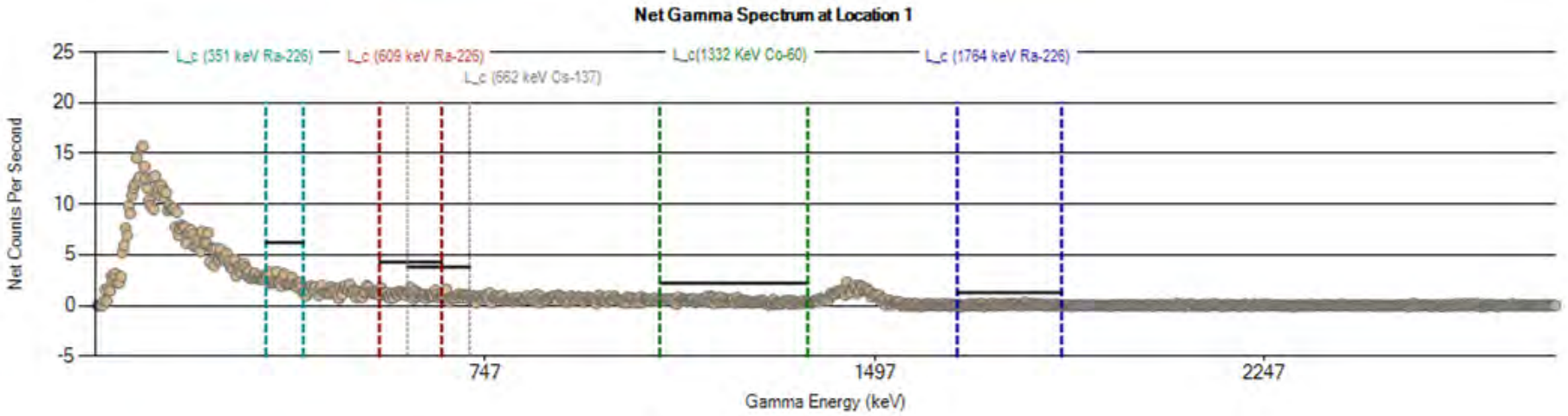
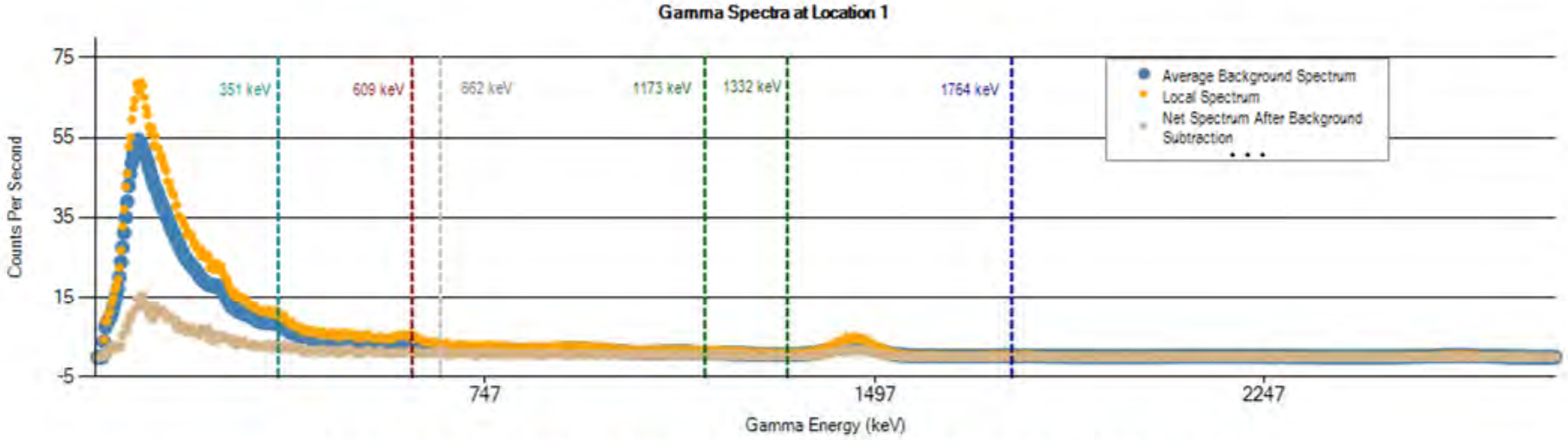
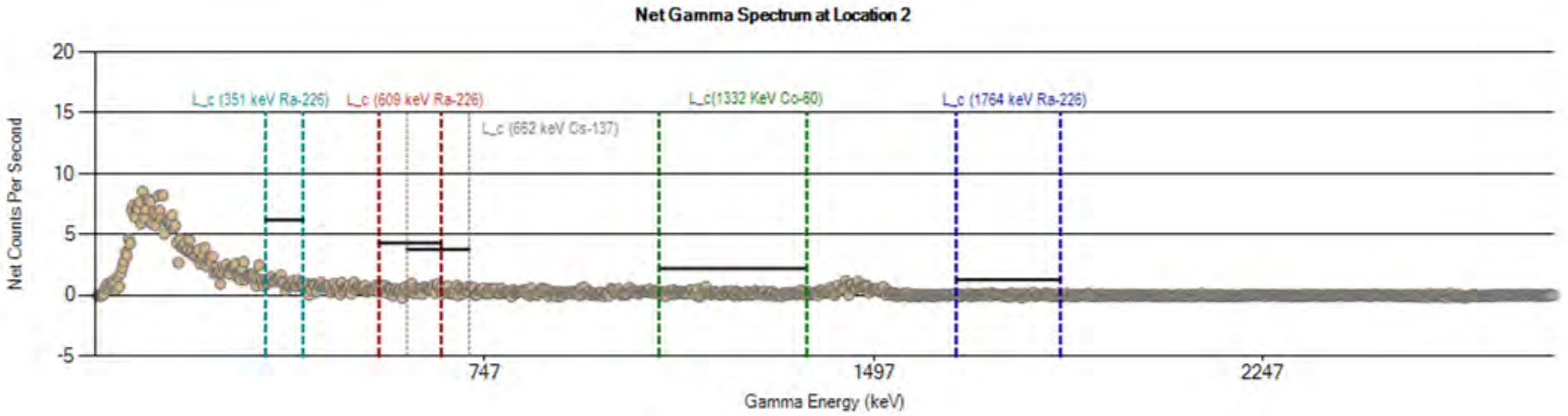
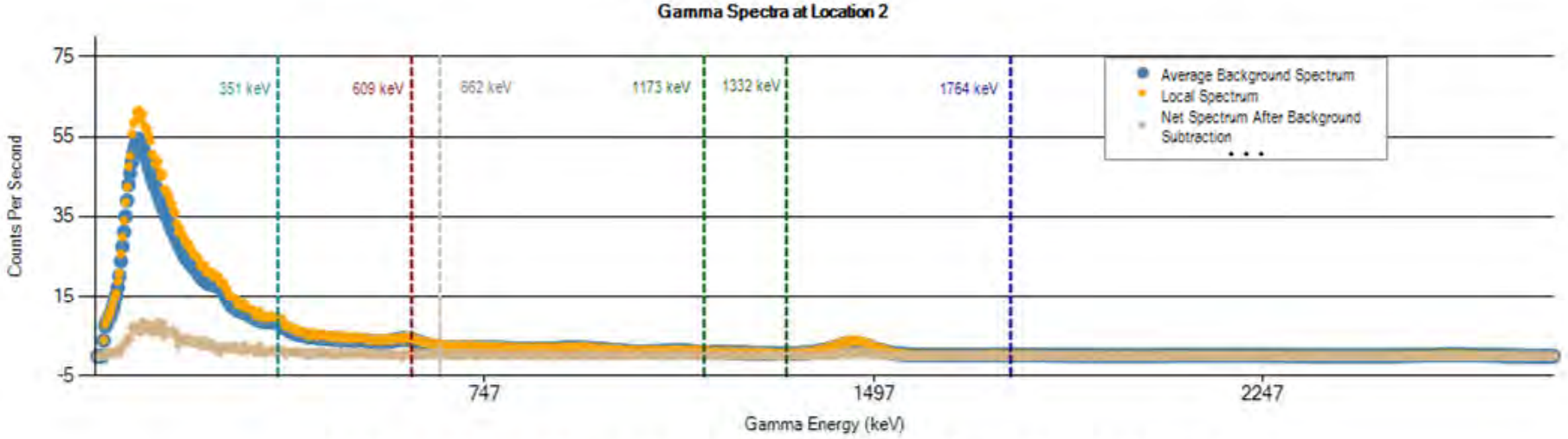


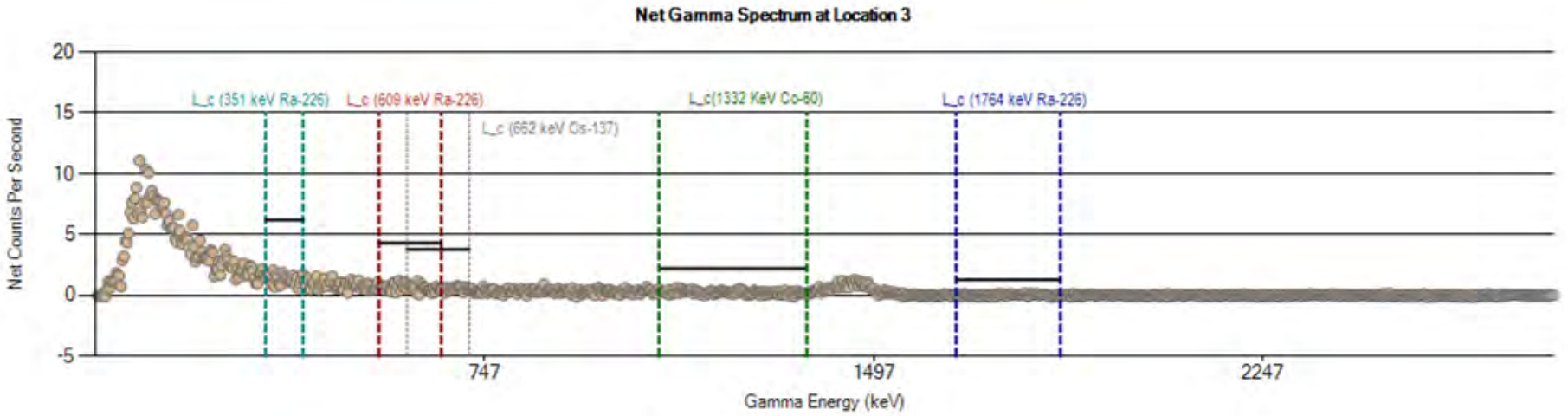


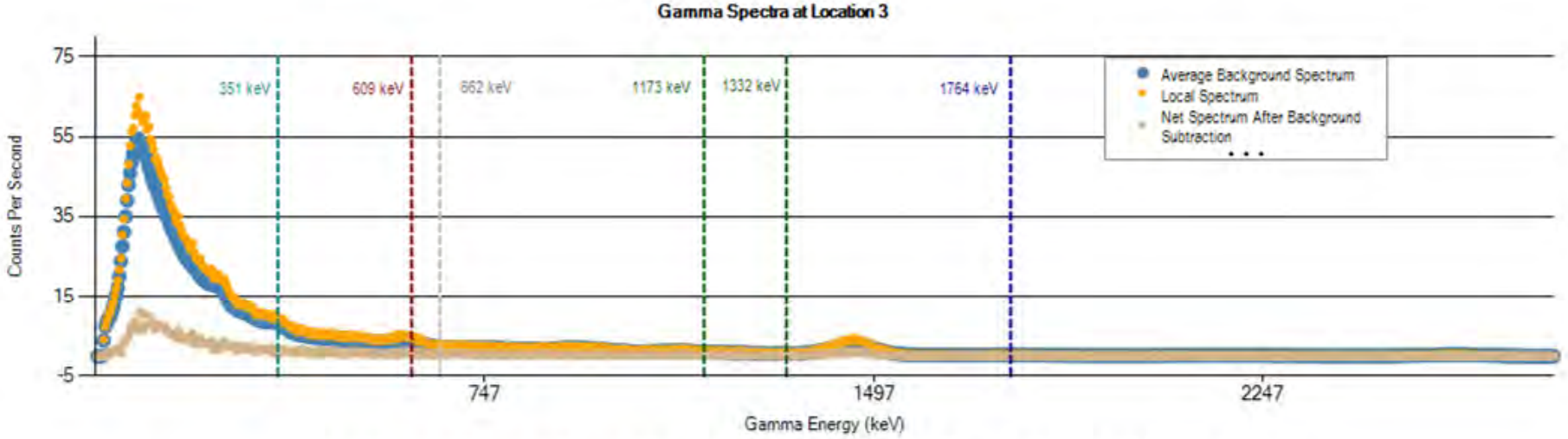
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 1 (cps)	**1170**	**172**	25	27	**203**	186	**148**	**232**	**130**	**4673**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



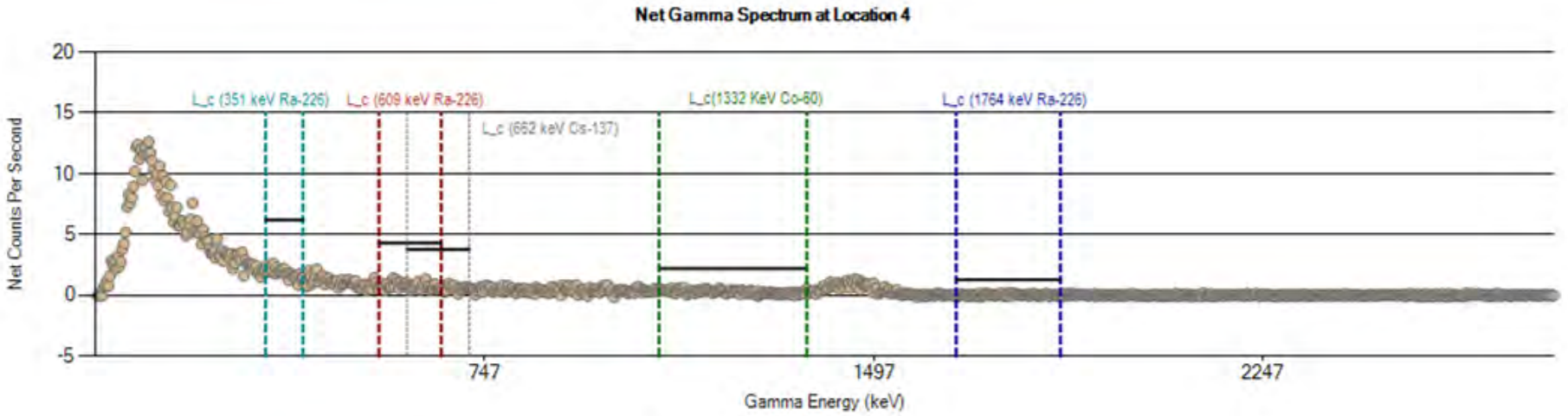


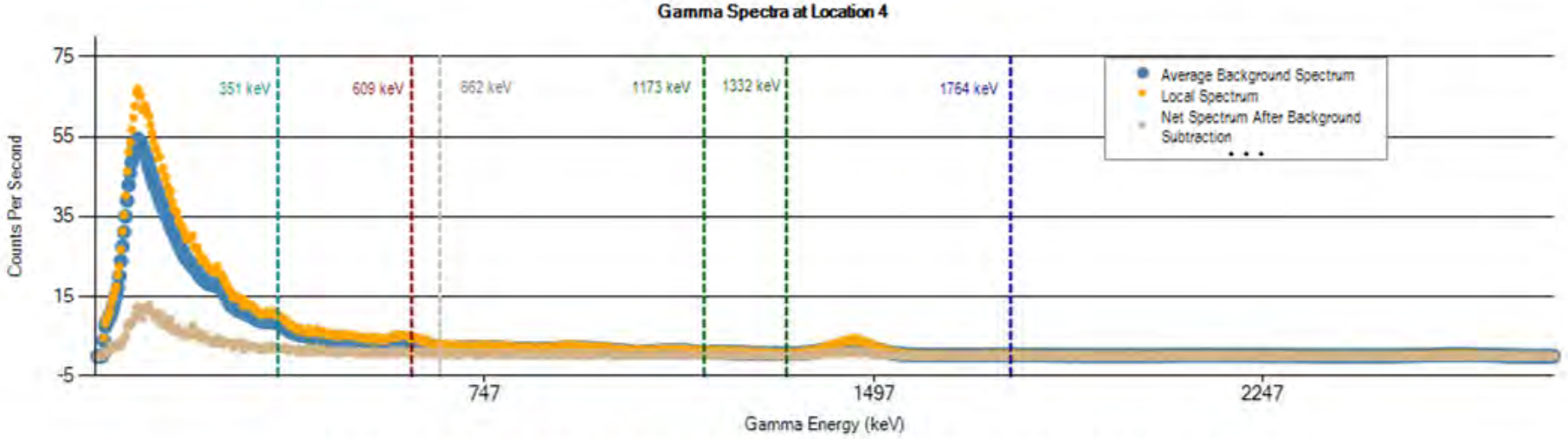
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 2 (cps)	986	140	23	23	174	160	127	202	107	4141
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



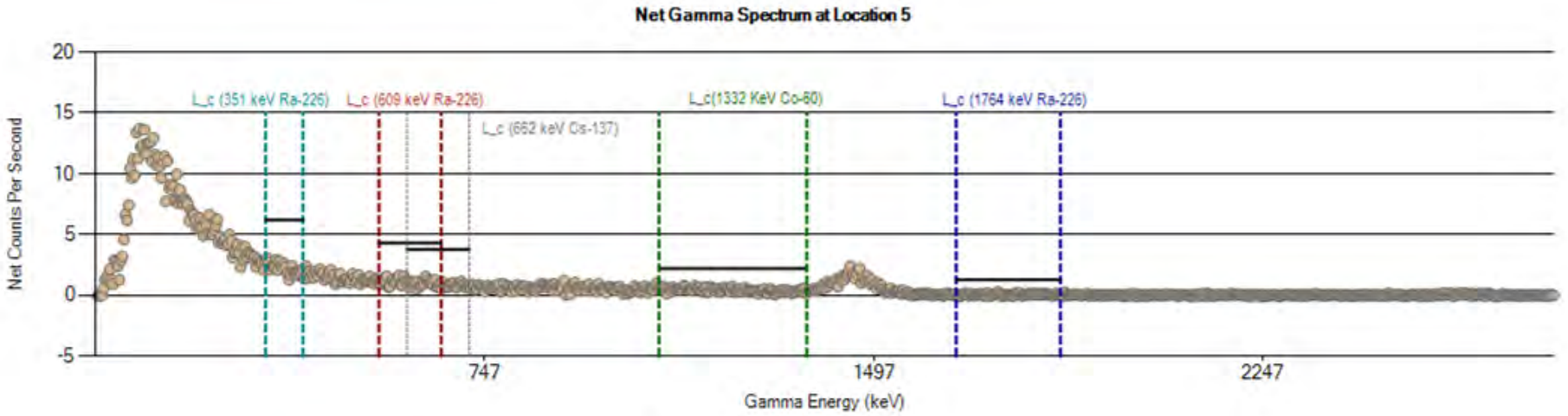


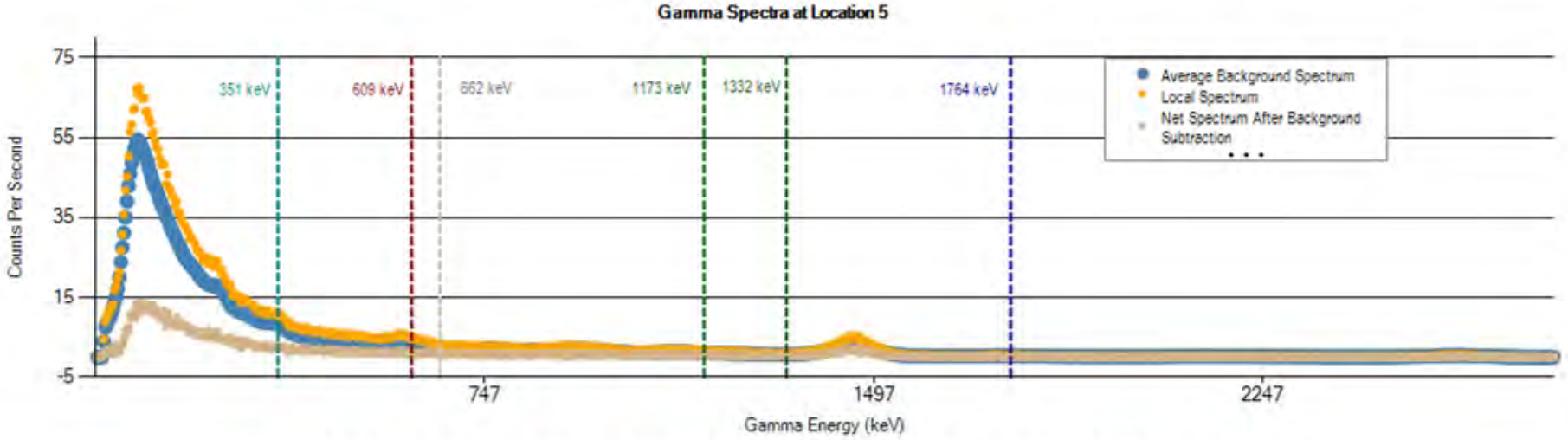
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 3 (cps)	1028	149	22	24	179	166	130	208	112	4240
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



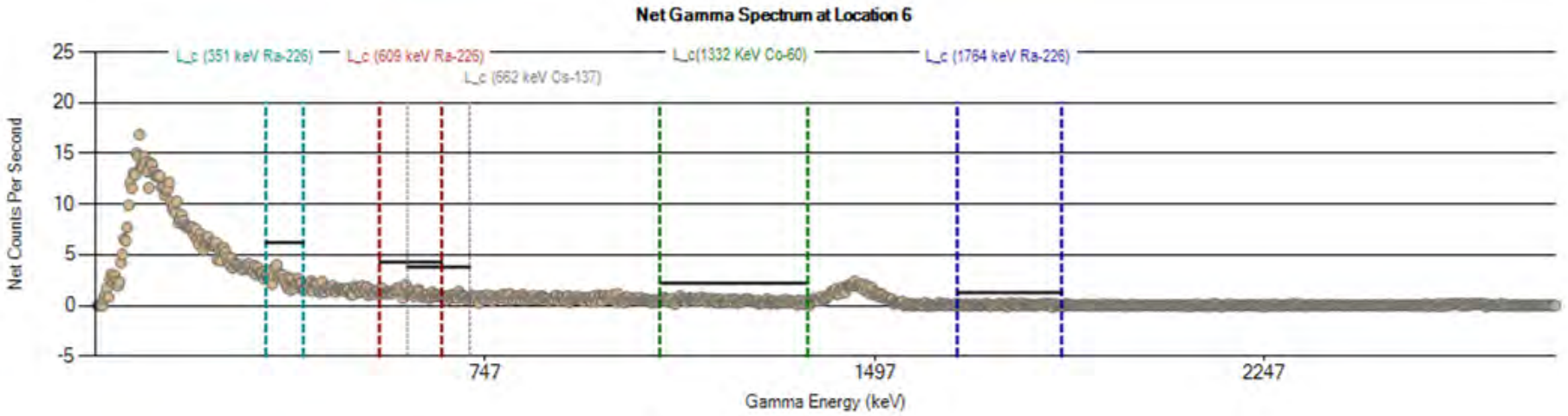


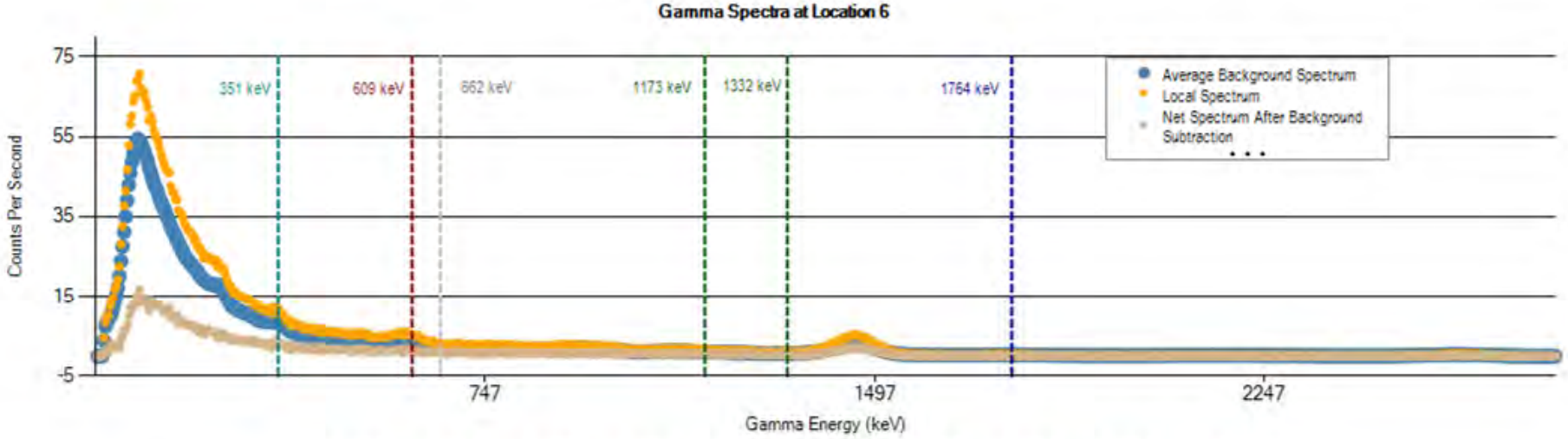
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 4 (cps)	1069	153	23	26	186	172	133	219	116	4438
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



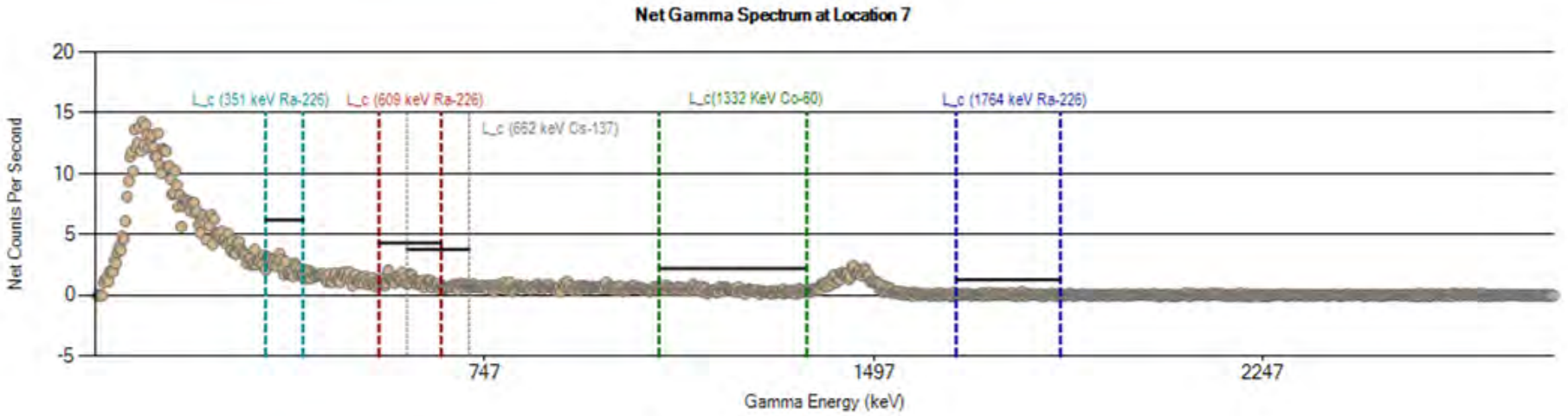


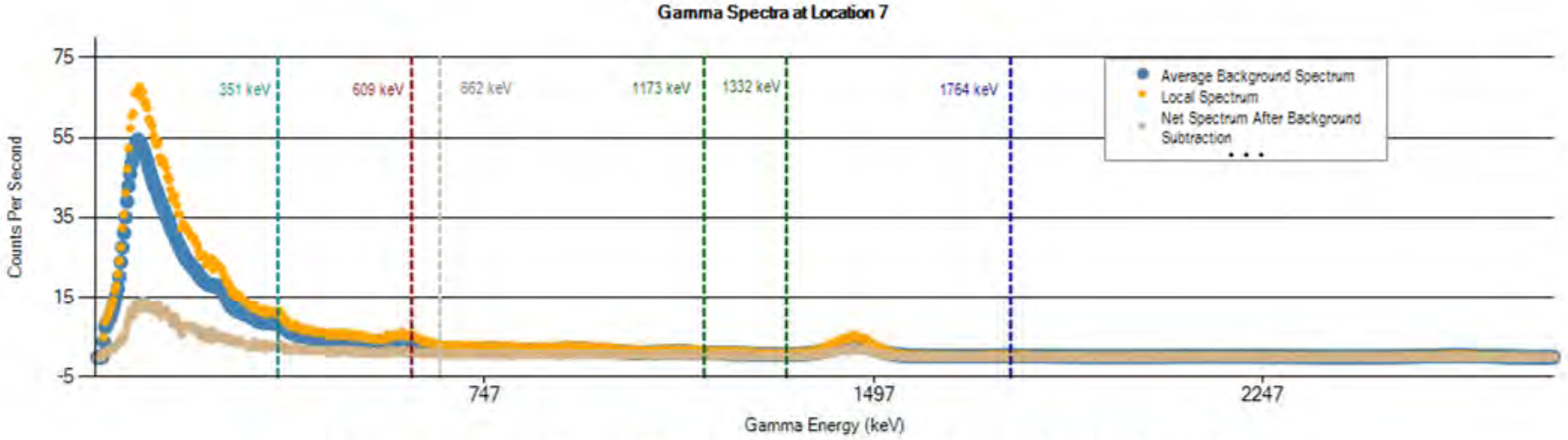
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 5 (cps)	**1164**	**174**	25	28	200	184	145	229	**130**	**4642**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



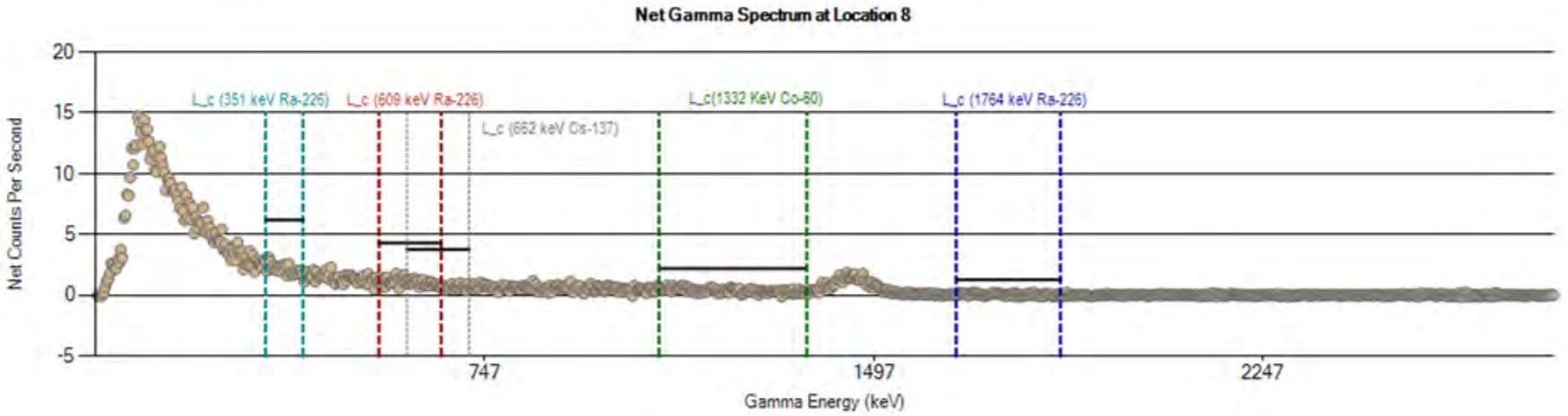


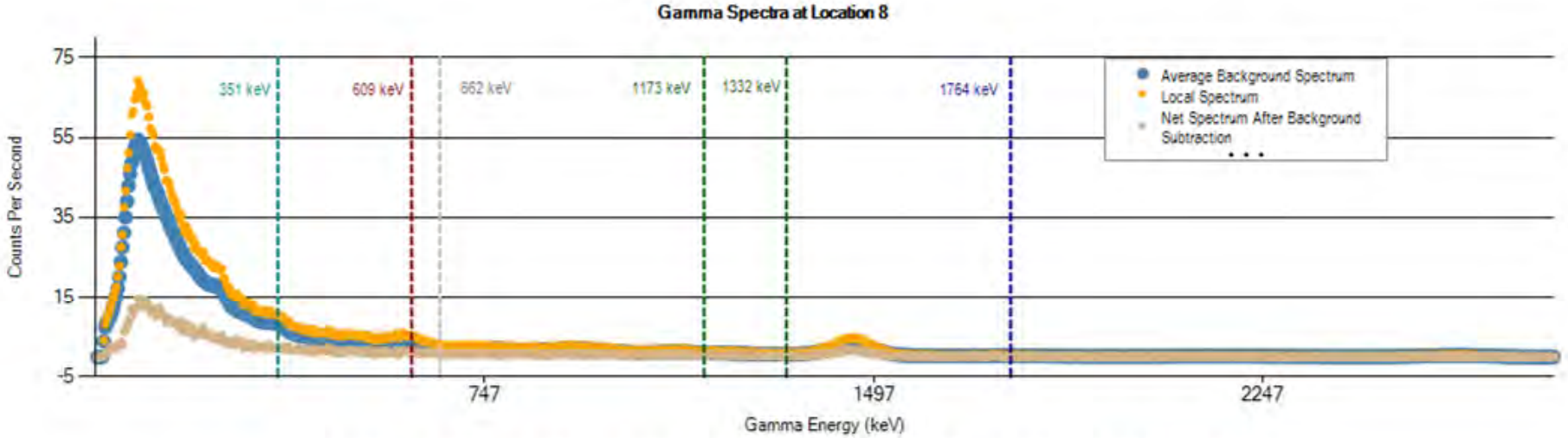
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 6 (cps)	**1204**	**184**	24	29	**207**	**190**	**148**	**238**	**132**	**4782**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



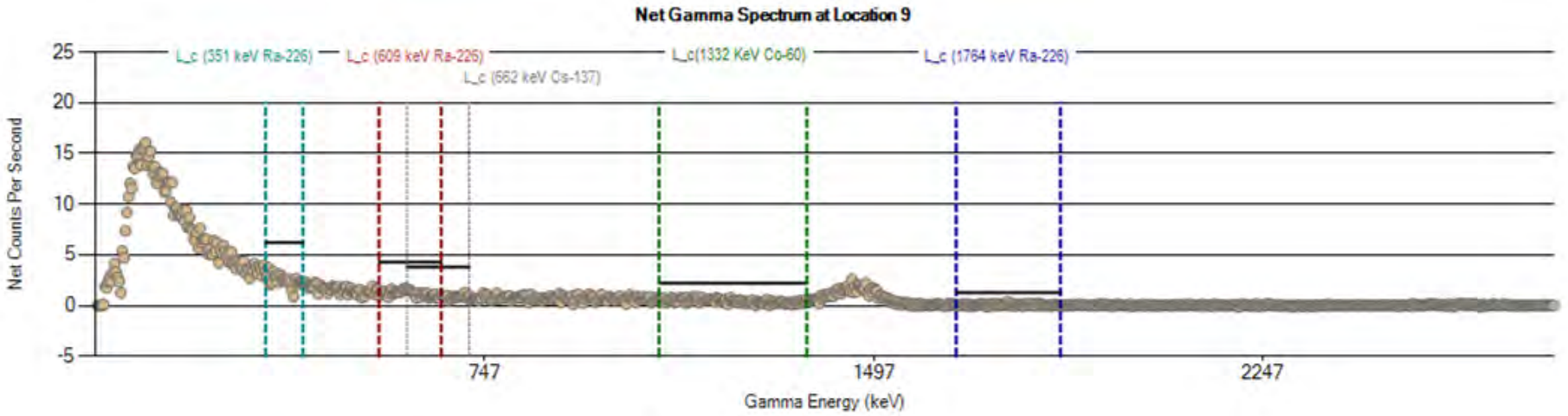


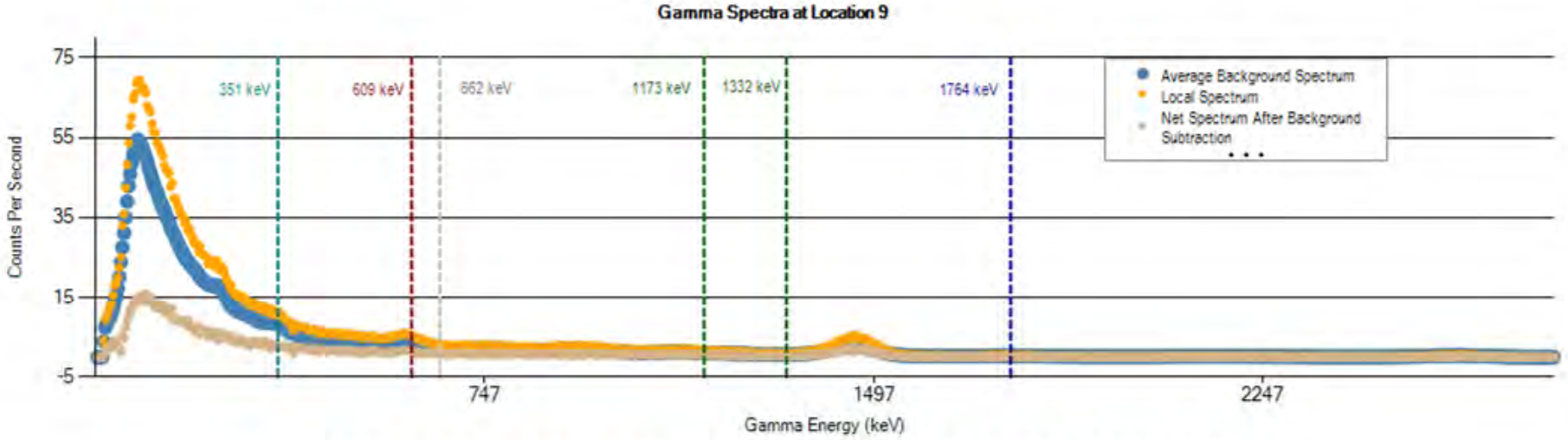
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 7 (cps)	1177	182	25	27	202	187	145	233	129	4698
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



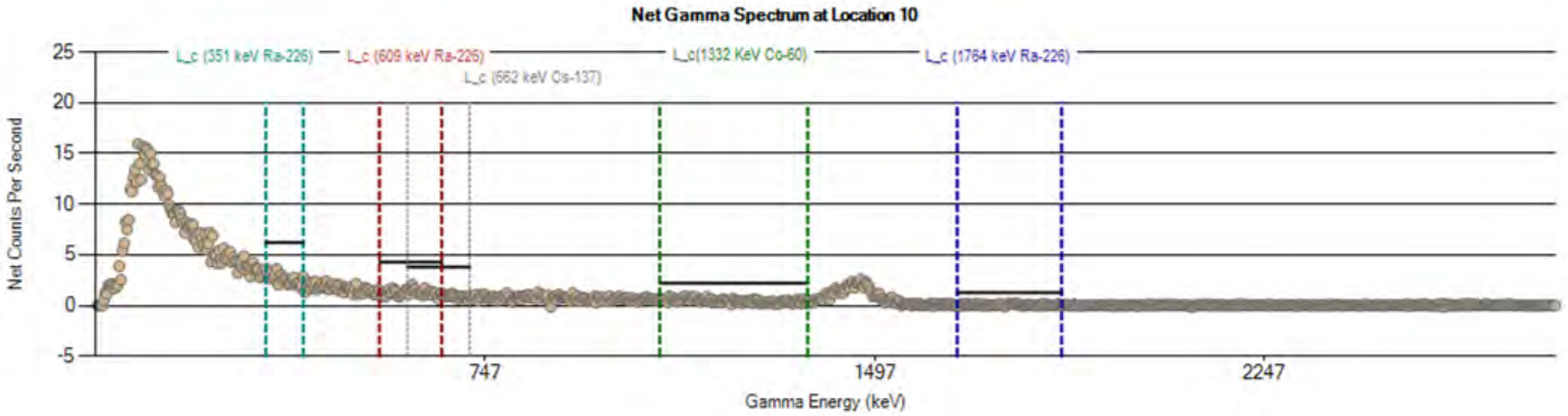


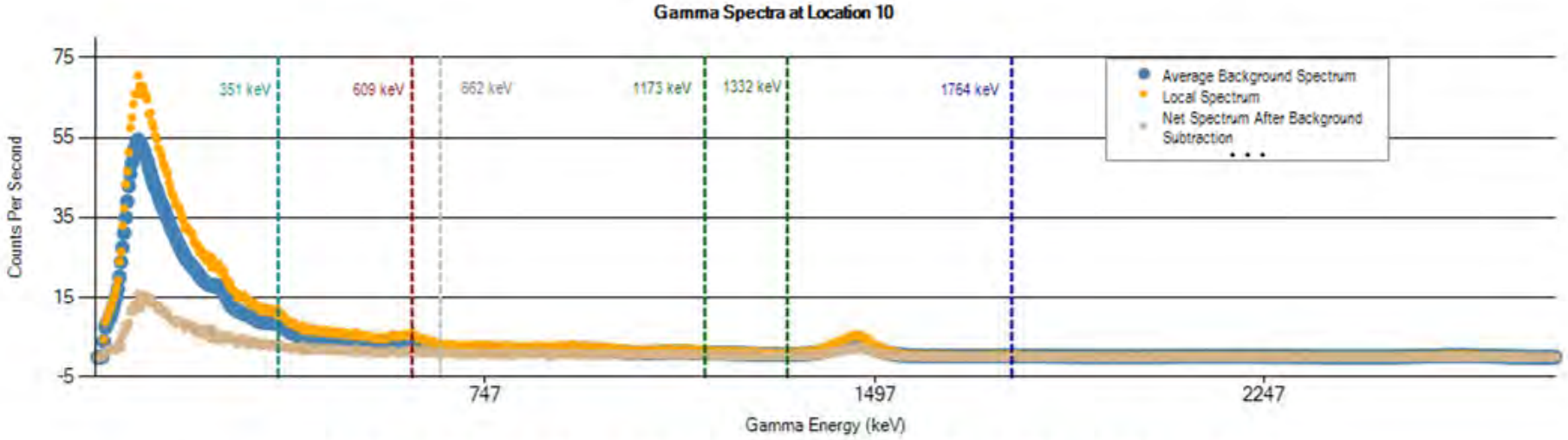
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 8 (cps)	1147	167	25	27	200	184	142	227	126	4628
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



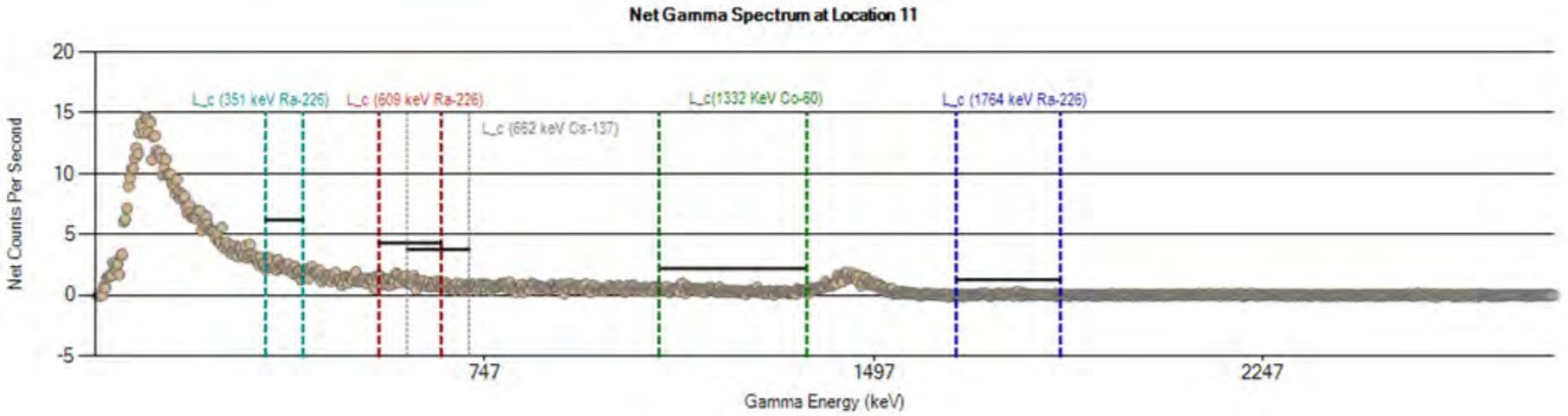


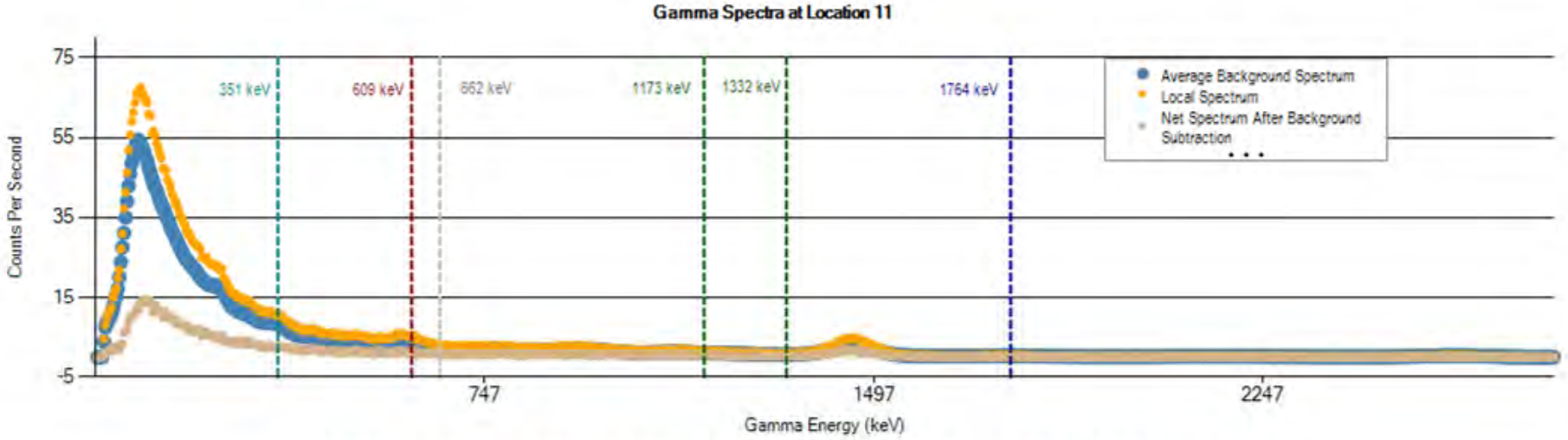
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 9 (cps)	**1199**	**182**	24	29	**206**	189	**147**	**236**	**131**	**4797**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



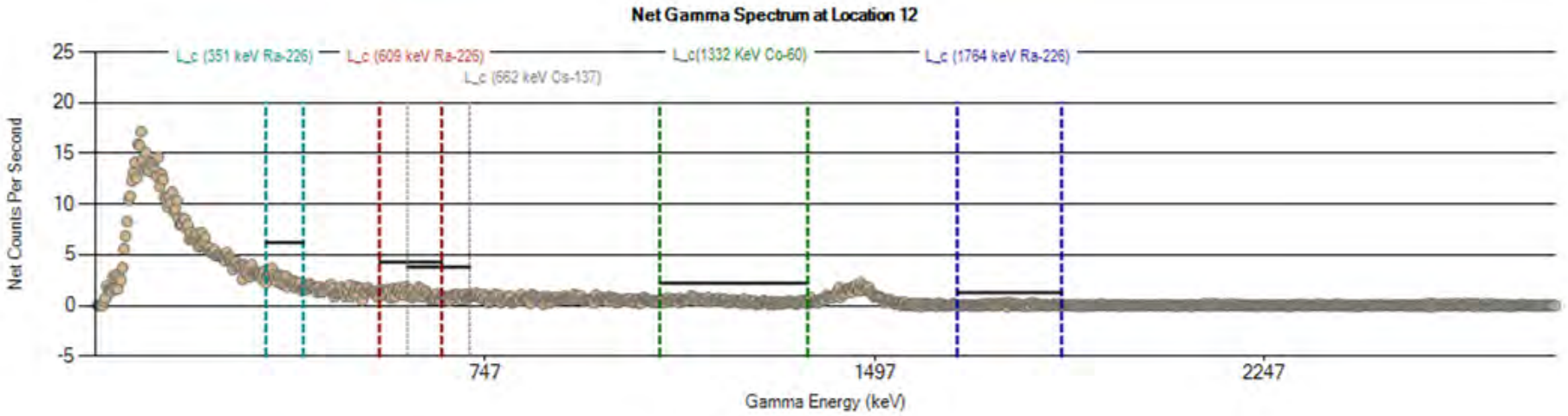


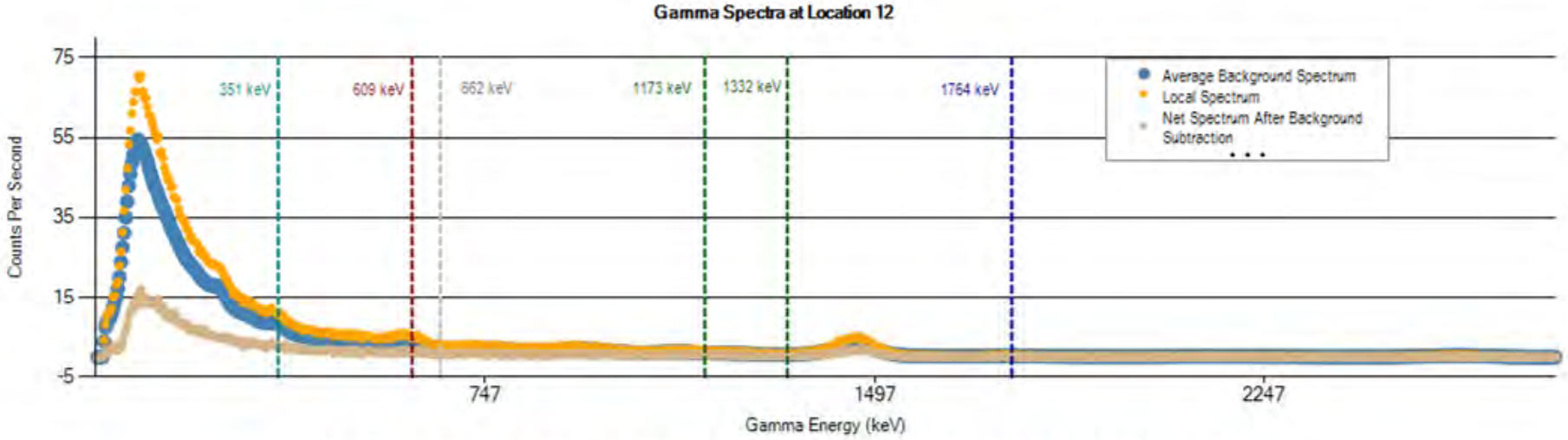
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 10 (cps)	1217	185	25	29	209	192	152	238	133	4787
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



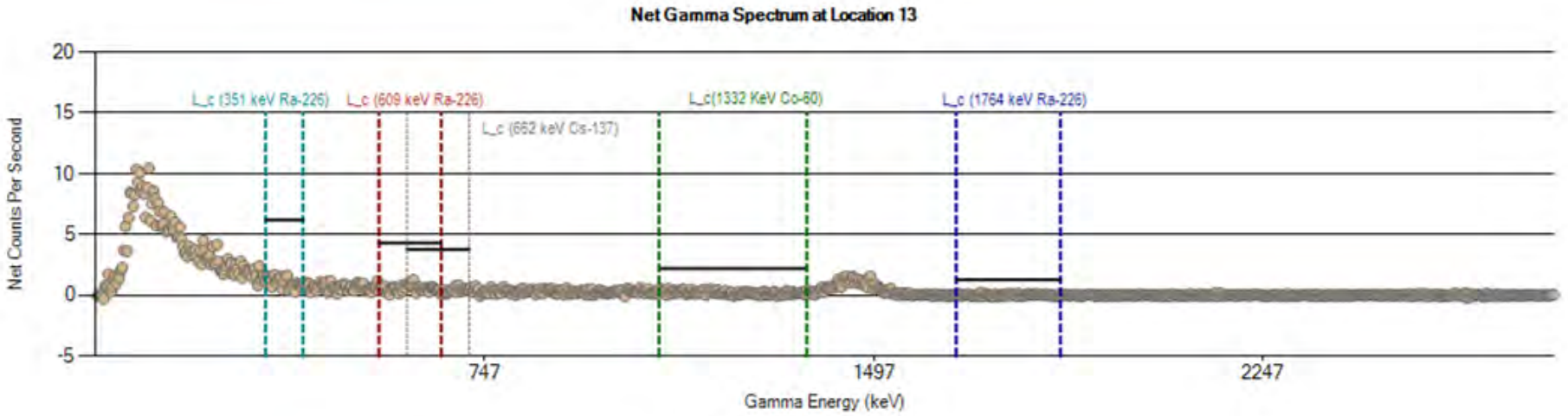


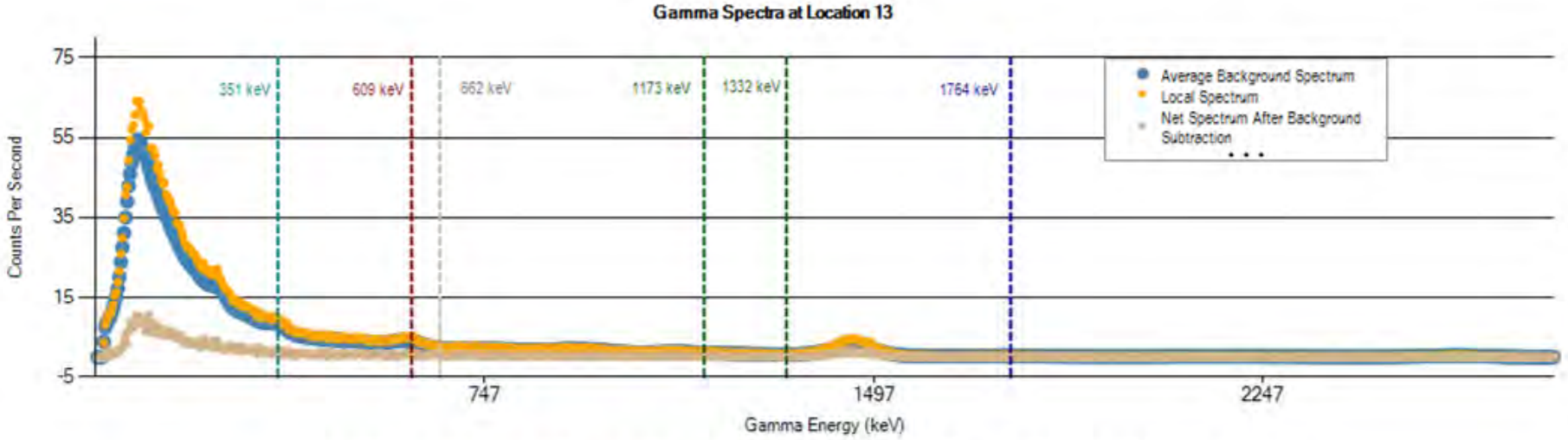
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 11 (cps)	1161	171	24	26	201	186	143	231	126	4669
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



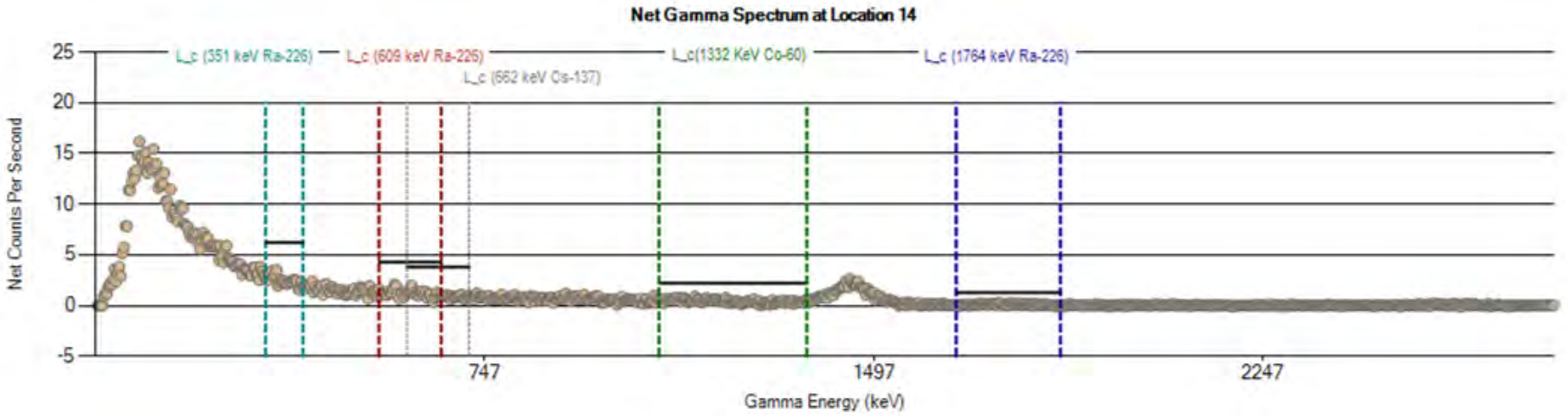


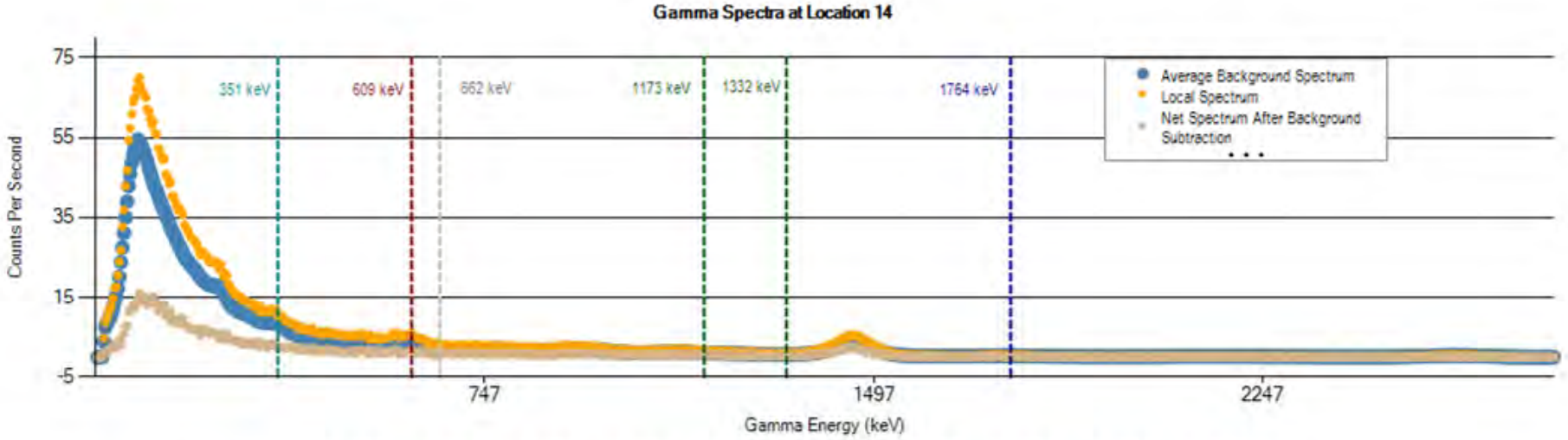
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 12 (cps)	1172	173	25	28	203	188	146	236	130	4735
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



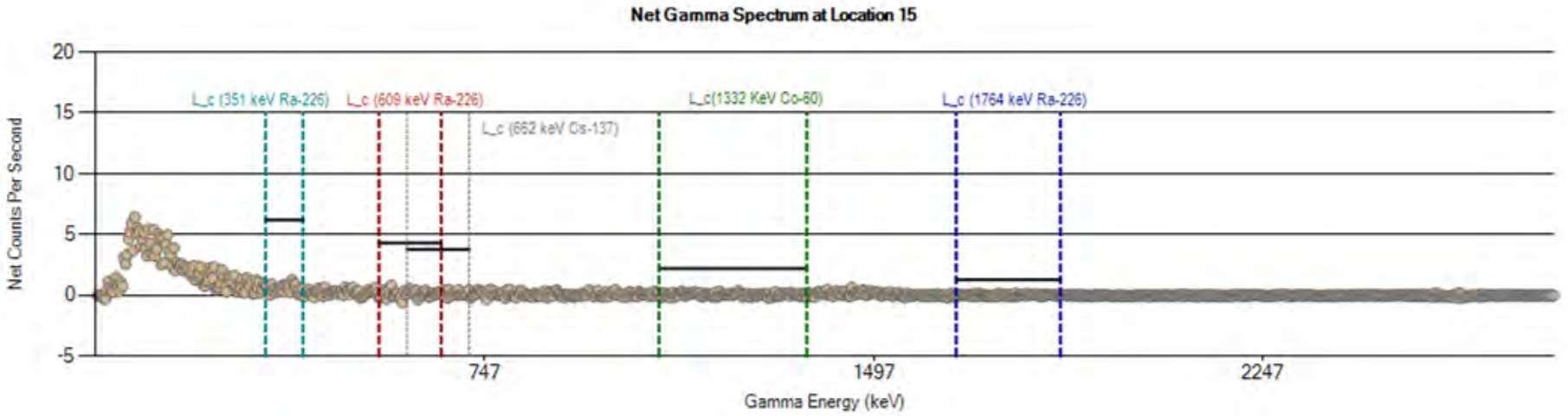


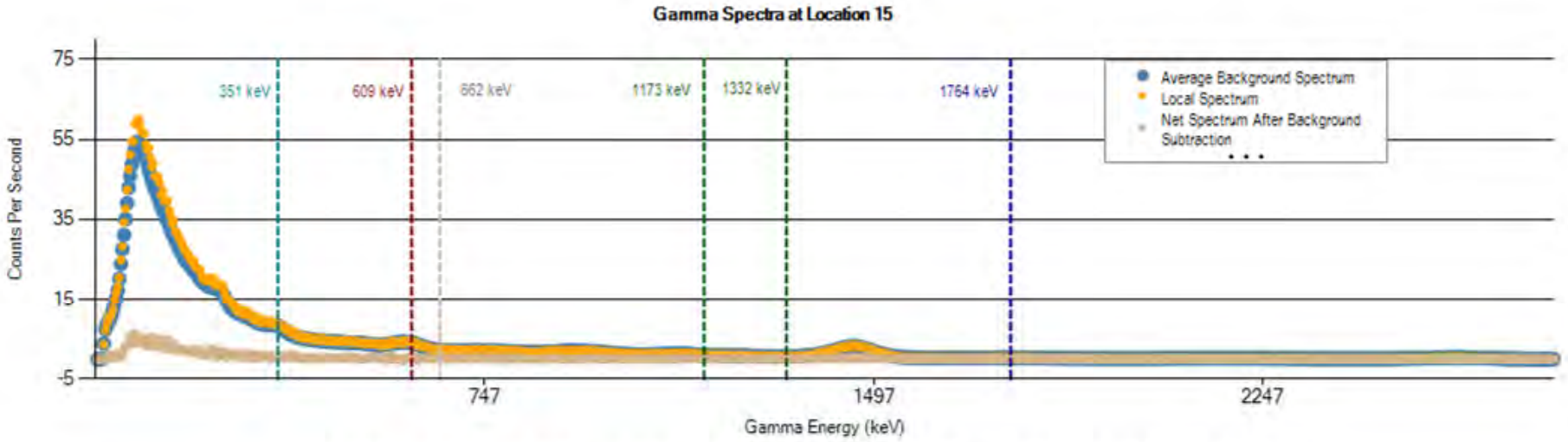
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 13 (cps)	1025	158	22	26	176	163	128	202	110	4228
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



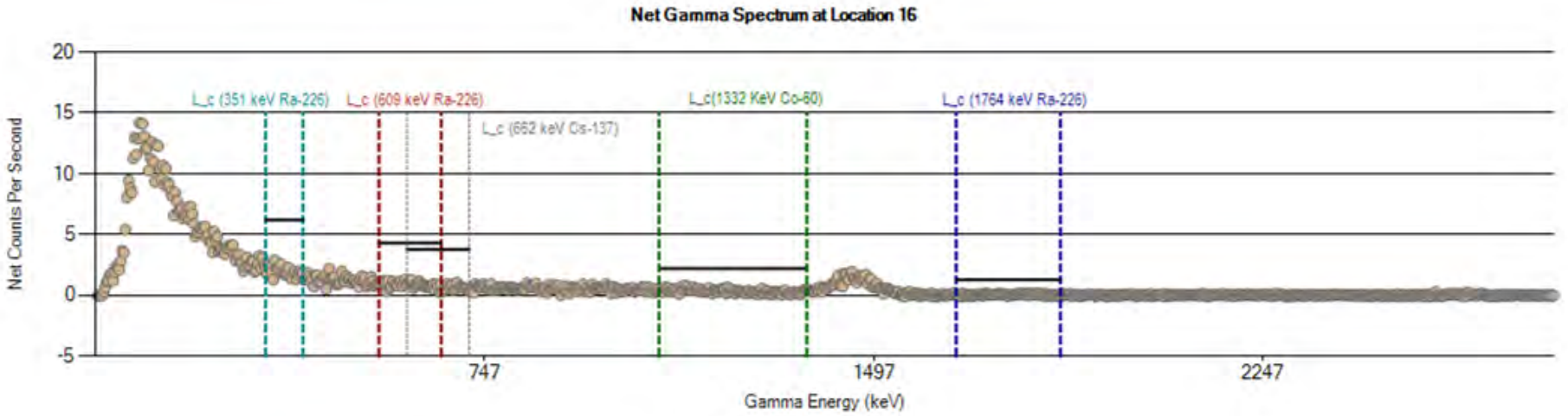


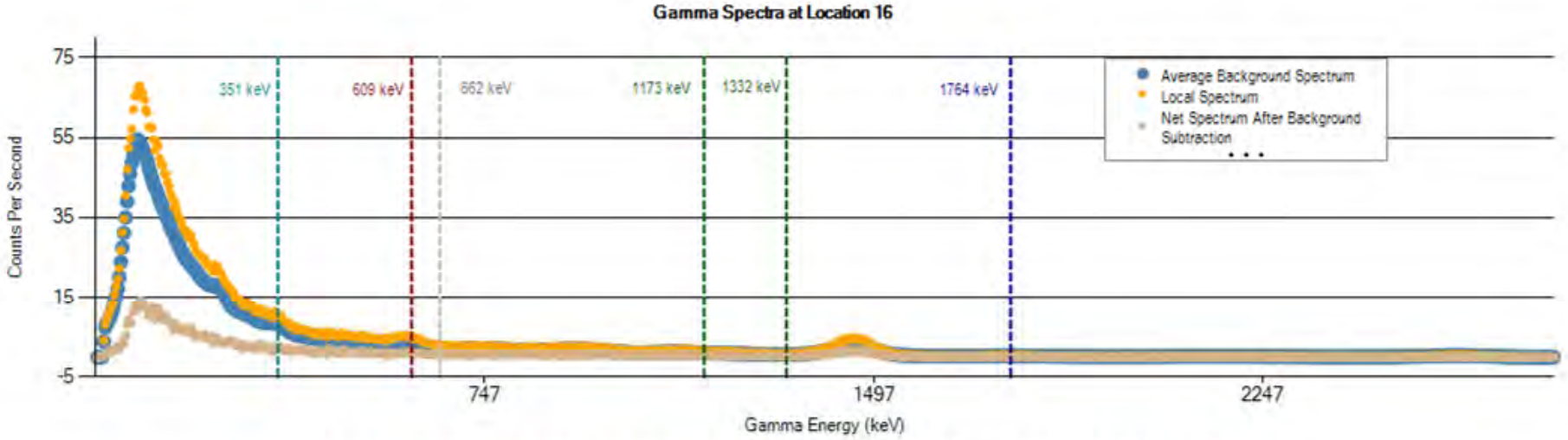
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 14 (cps)	**1192**	**185**	26	28	**204**	189	**149**	**236**	**130**	**4771**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



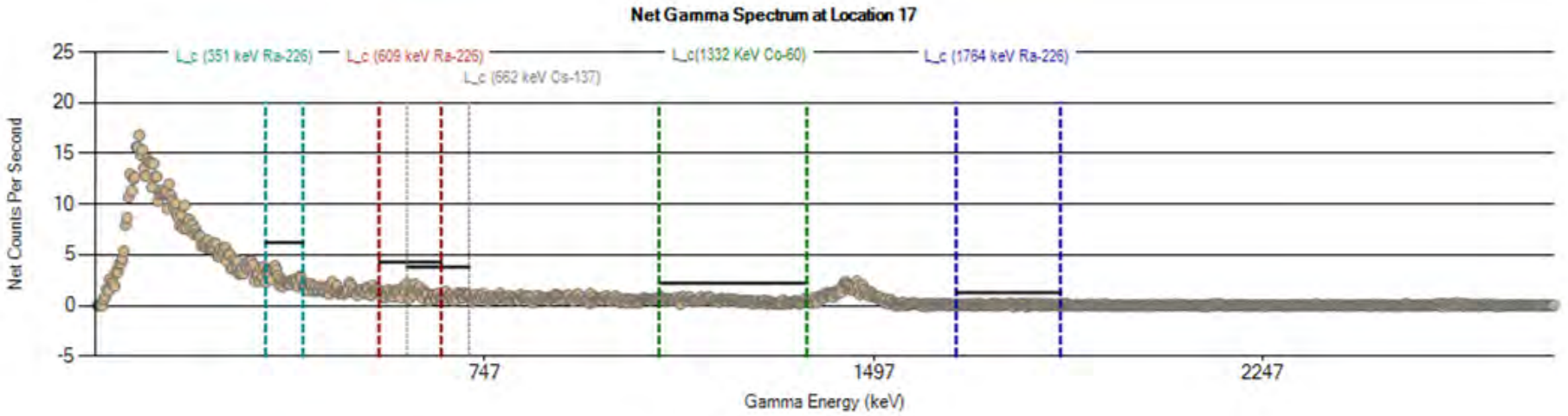


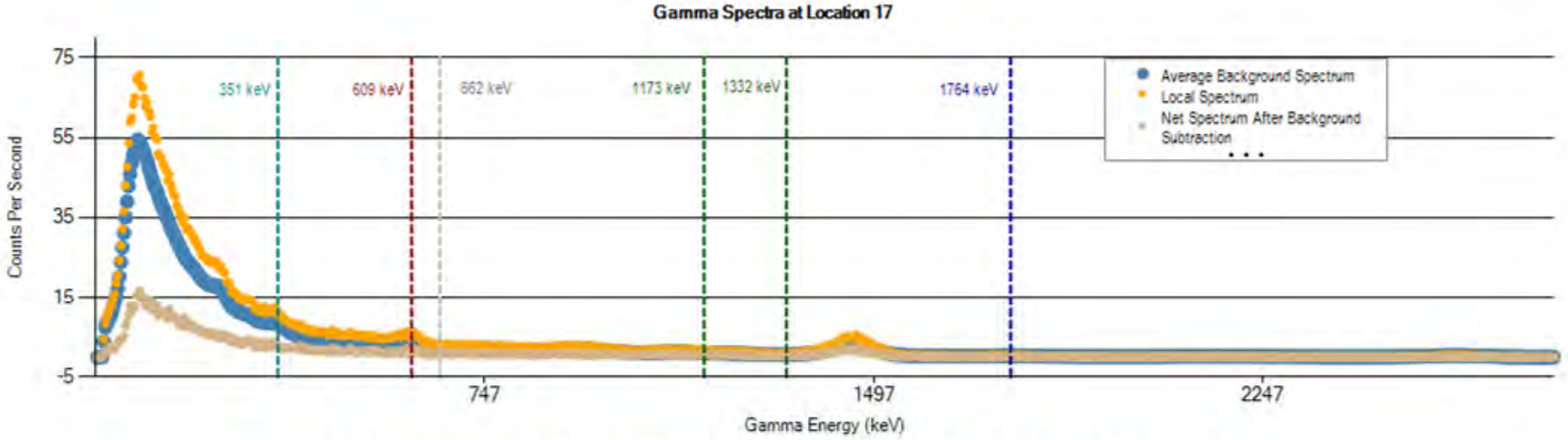
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 15 (cps)	902	124	22	23	161	146	114	188	95	3896
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



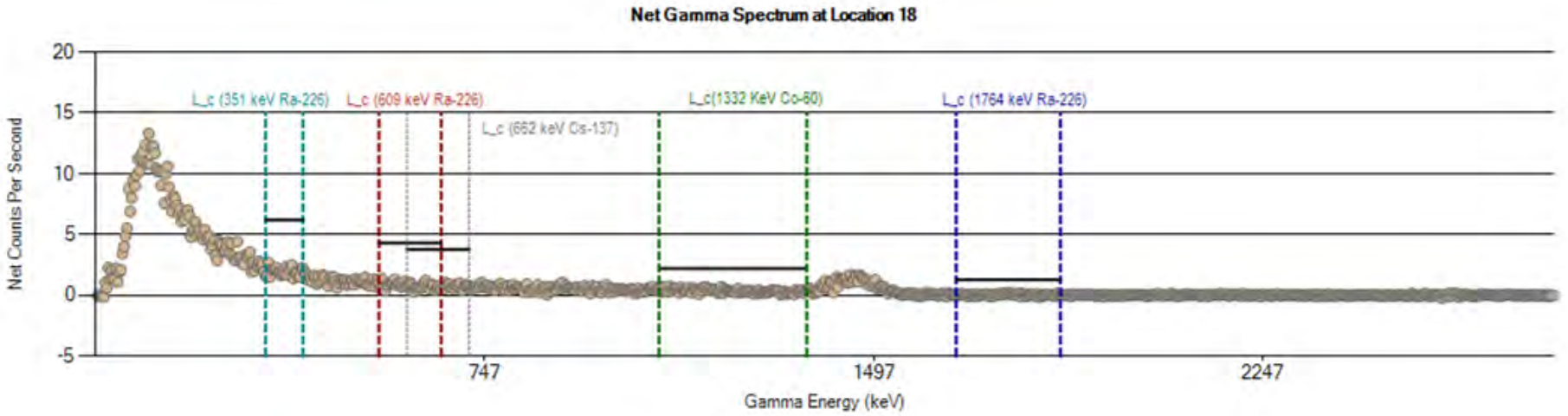


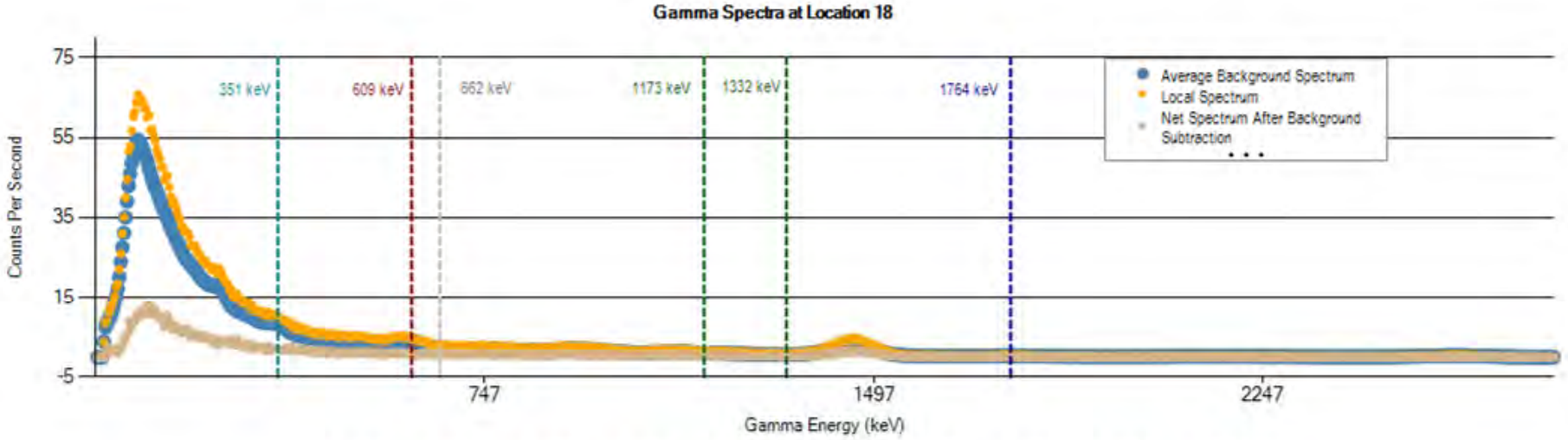
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 16 (cps)	1122	167	24	27	195	176	137	222	122	4553
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



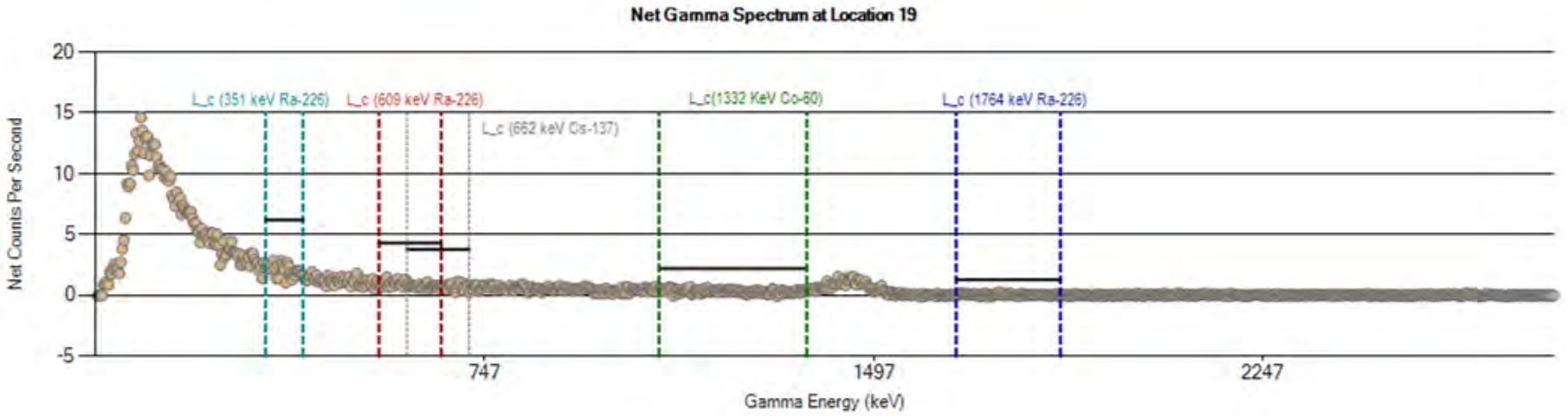


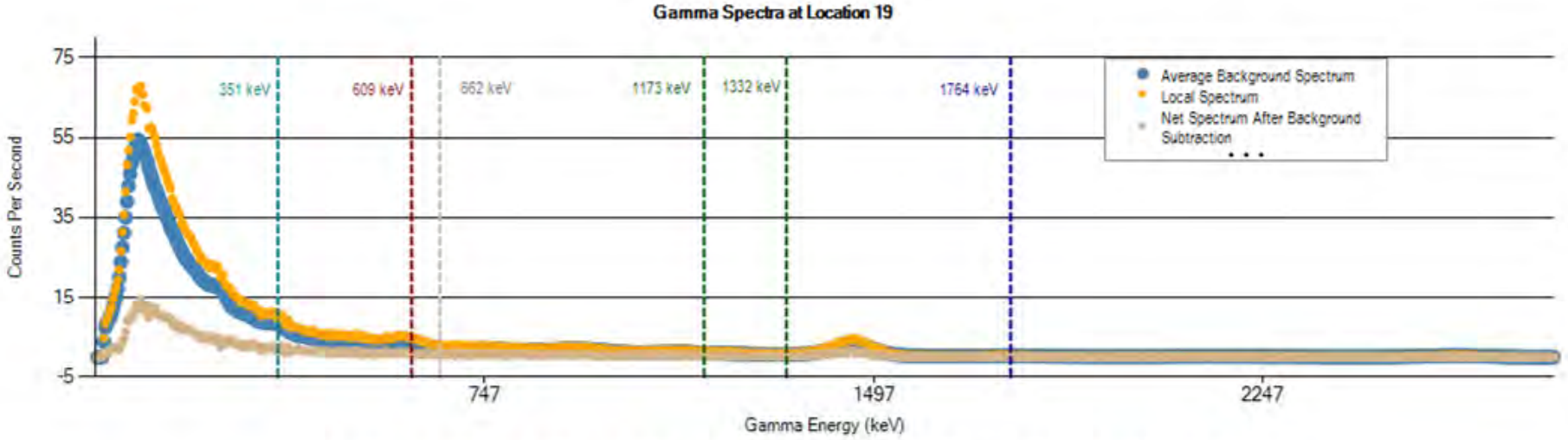
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 17 (cps)	**1198**	**178**	26	28	**206**	189	**149**	**240**	**133**	**4779**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



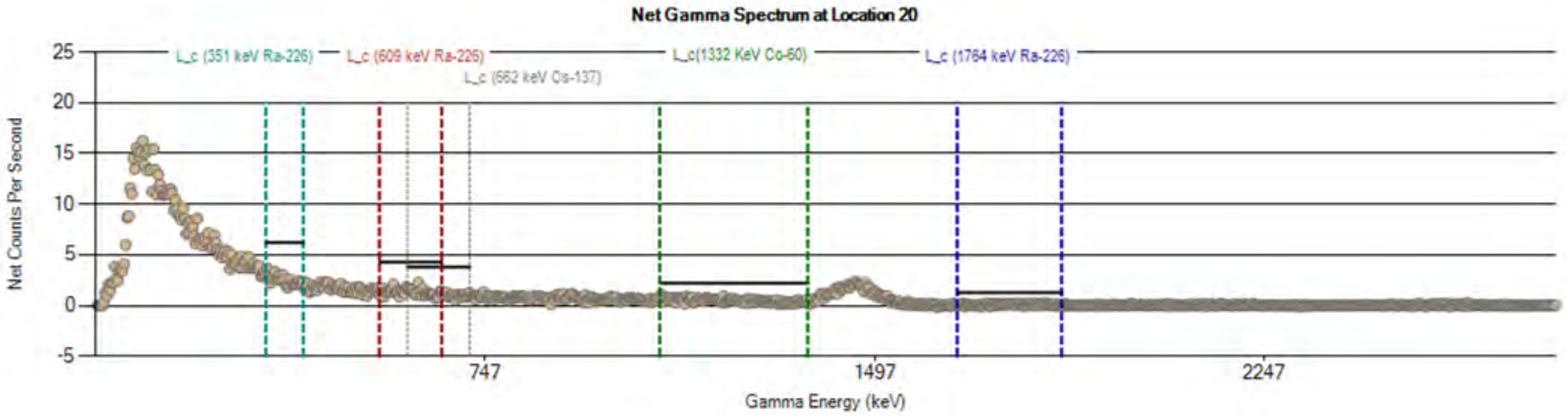


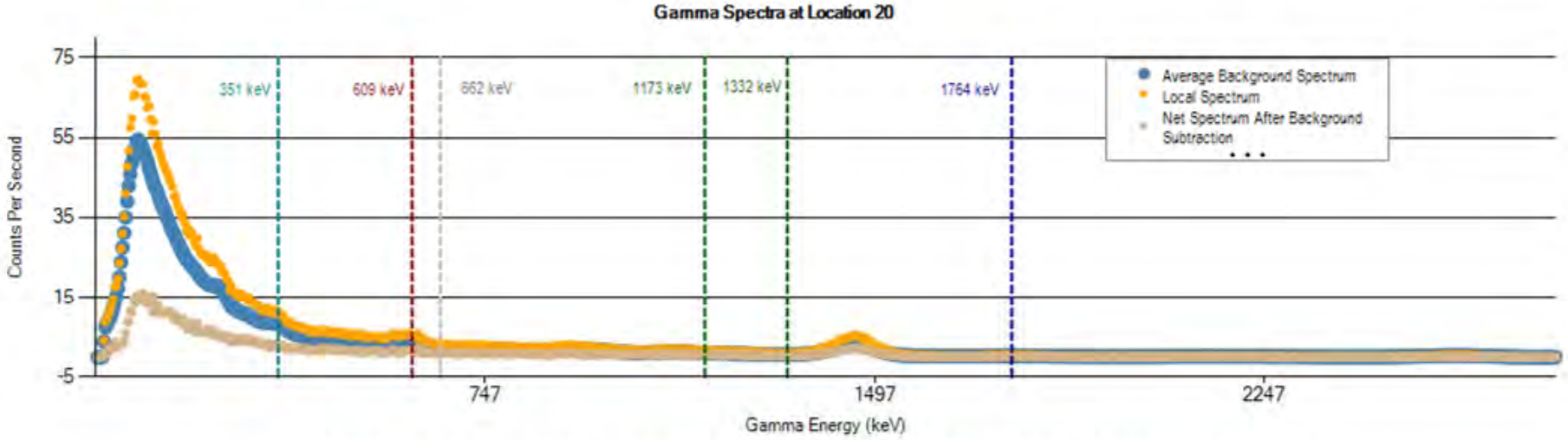
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 18 (cps)	1120	167	24	26	193	174	138	224	124	4516
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



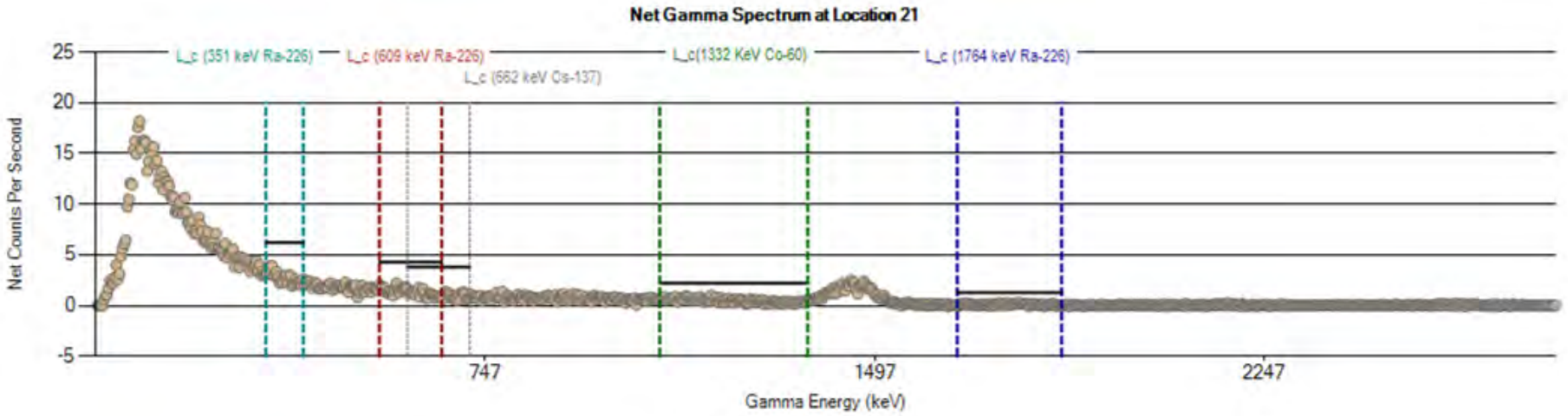


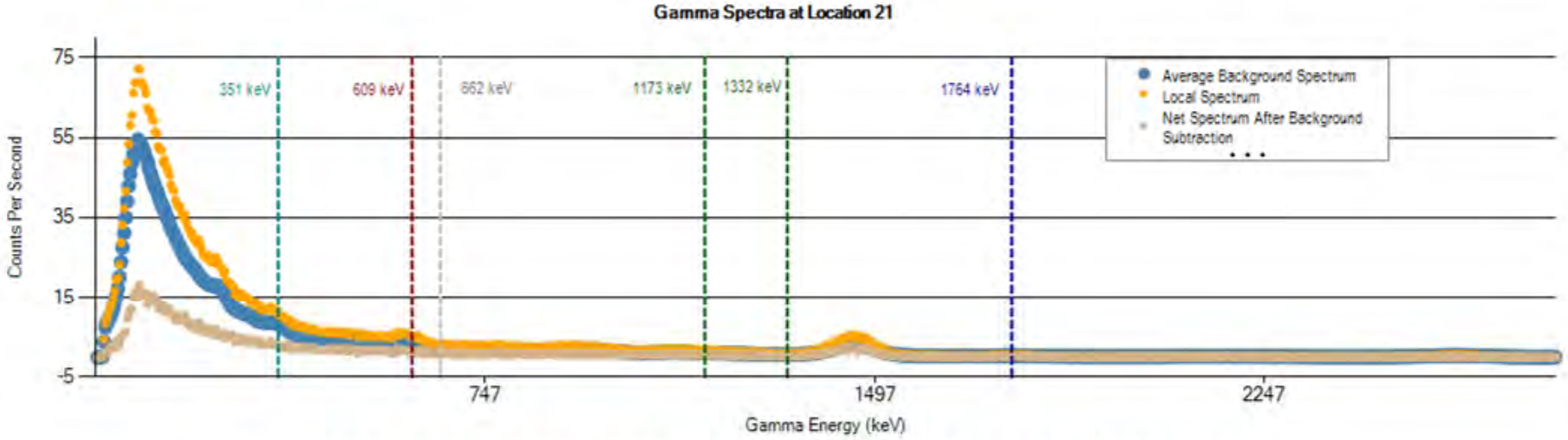
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 19 (cps)	1107	158	24	26	194	177	138	225	121	4554
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



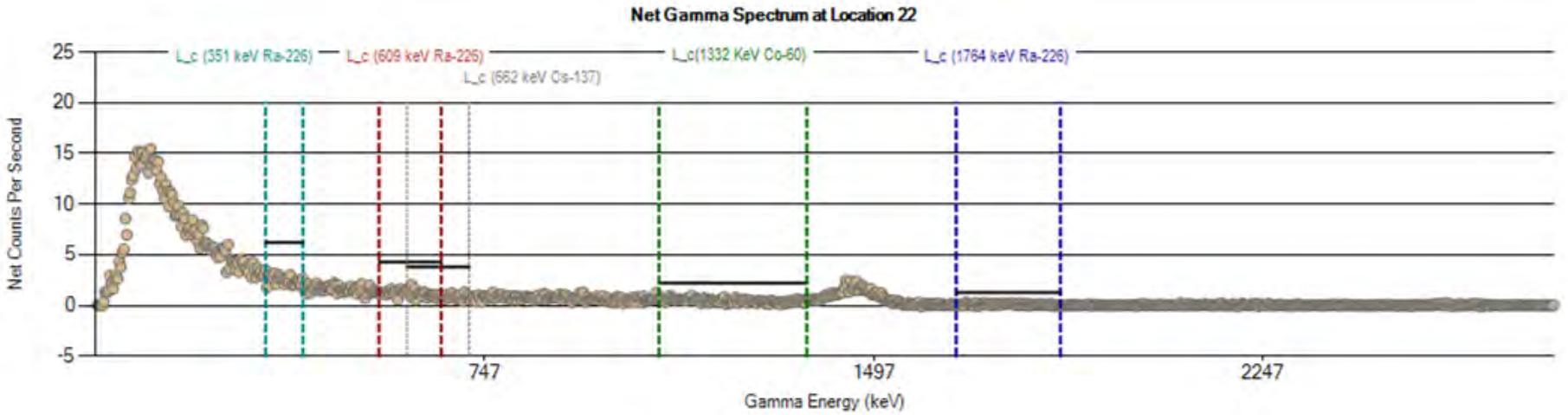


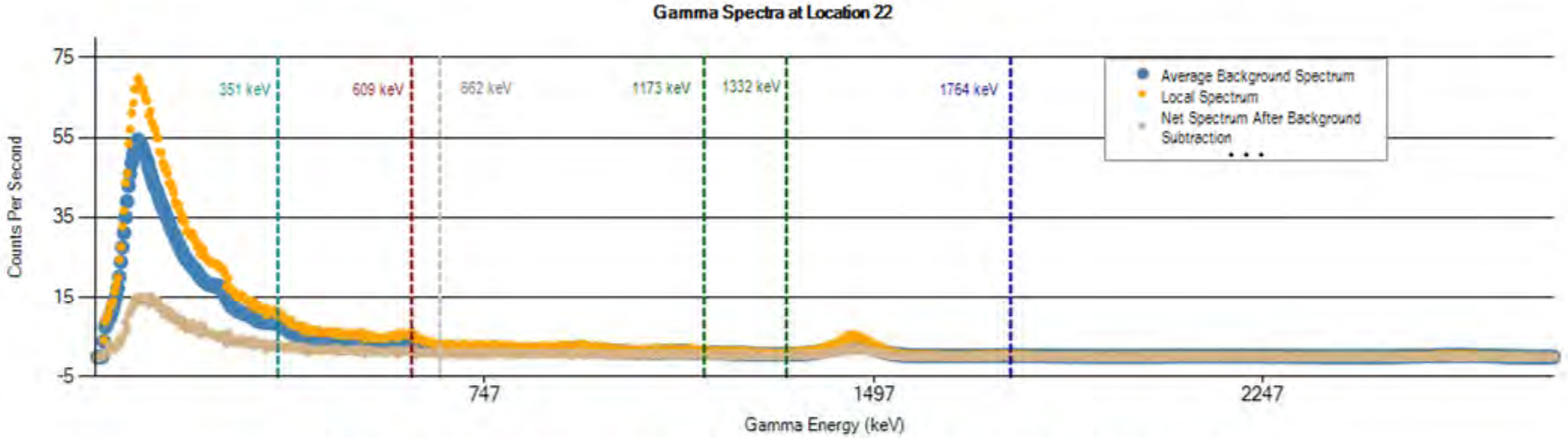
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 20 (cps)	1227	188	27	29	211	195	153	236	136	4813
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



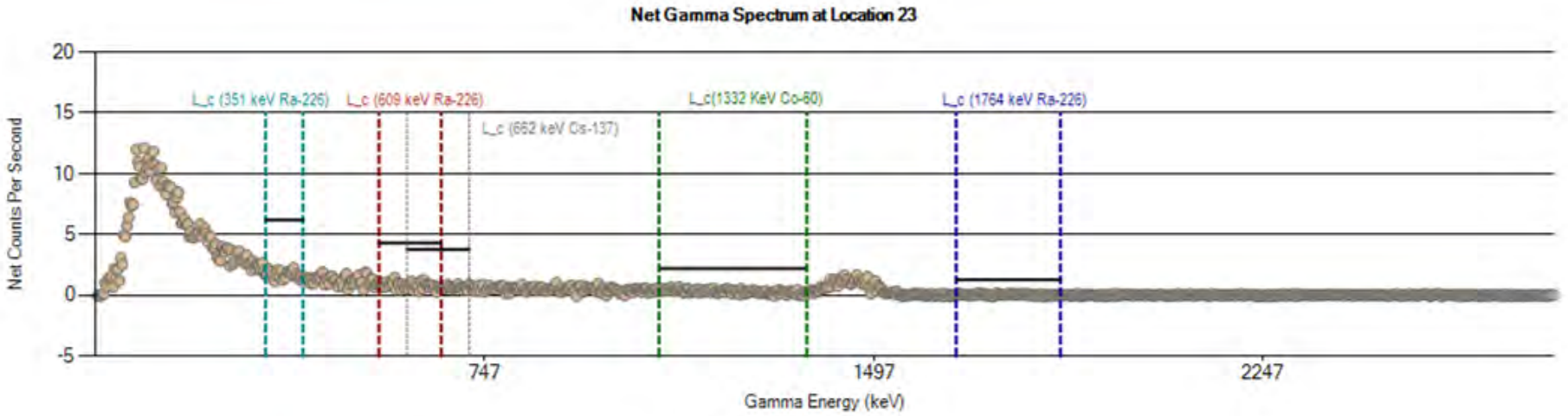


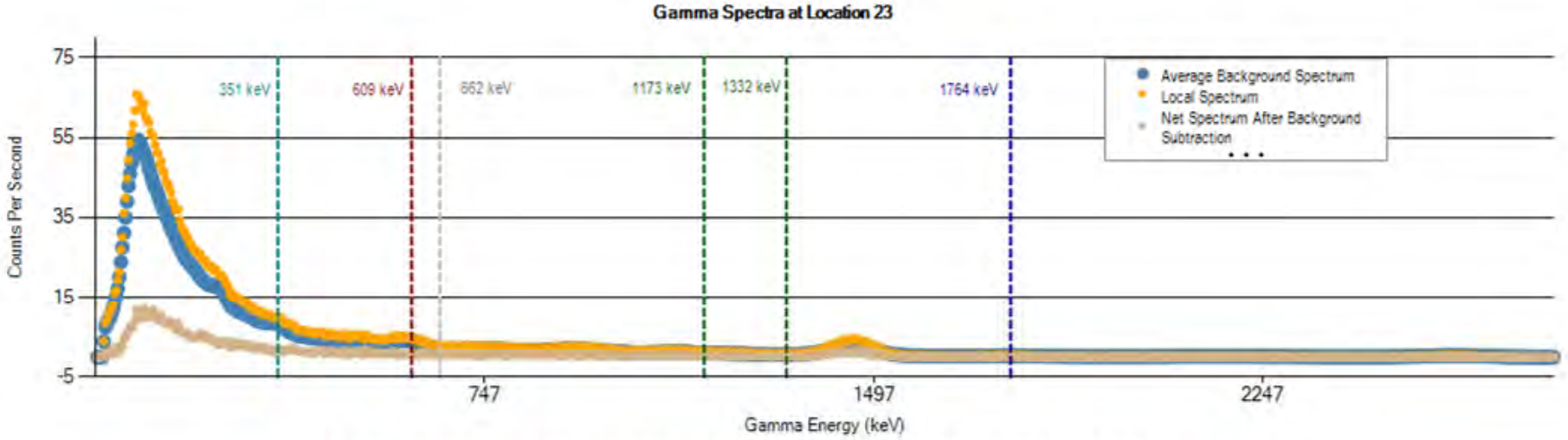
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 21 (cps)	1233	189	27	29	216	193	149	242	134	4885
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



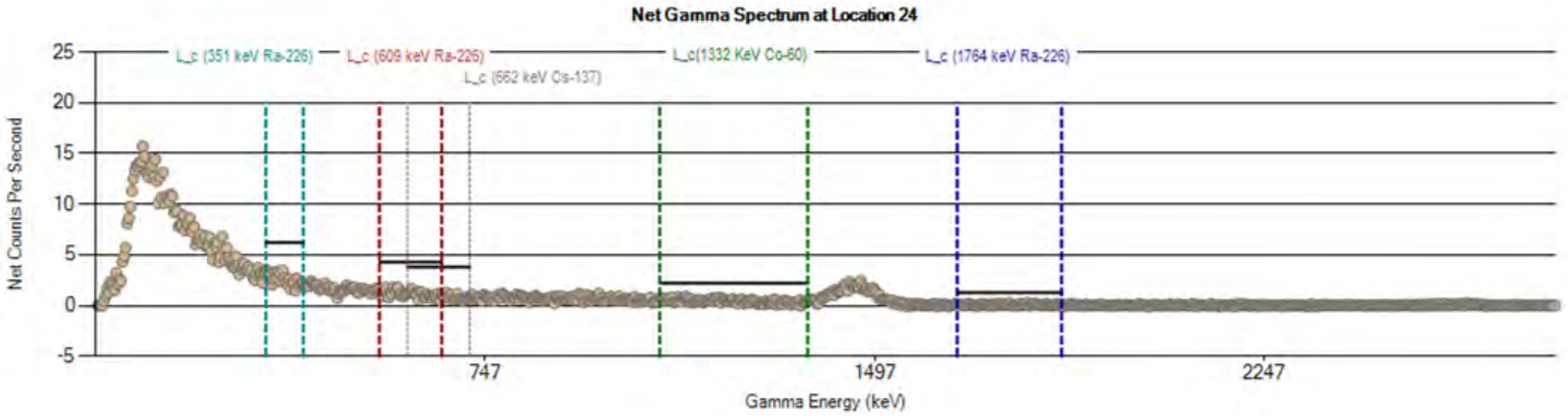


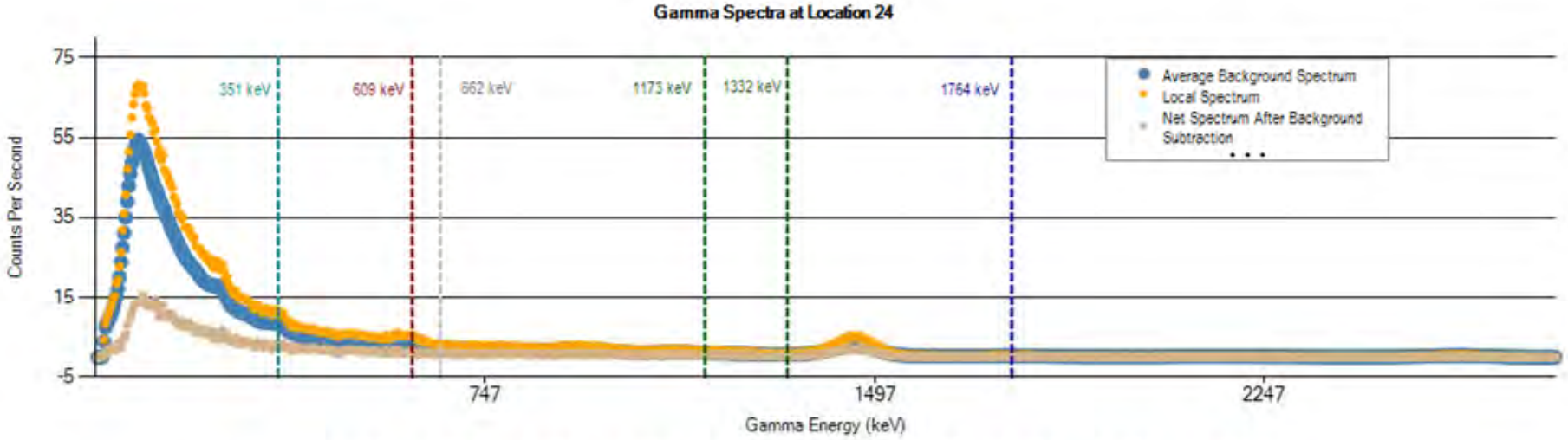
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 22 (cps)	**1207**	**181**	27	28	**209**	189	**147**	**236**	**133**	**4795**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



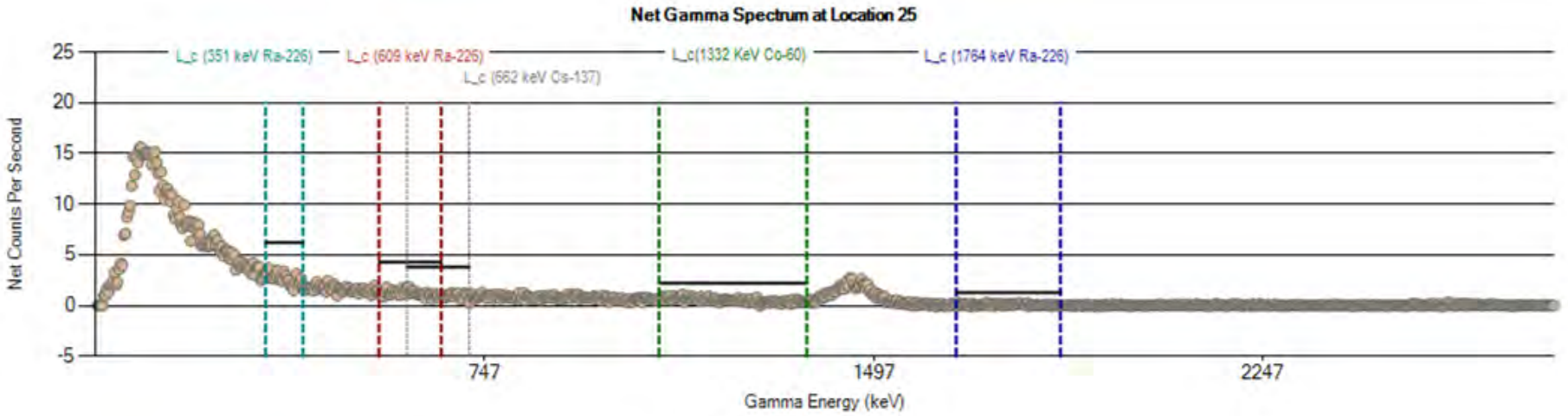


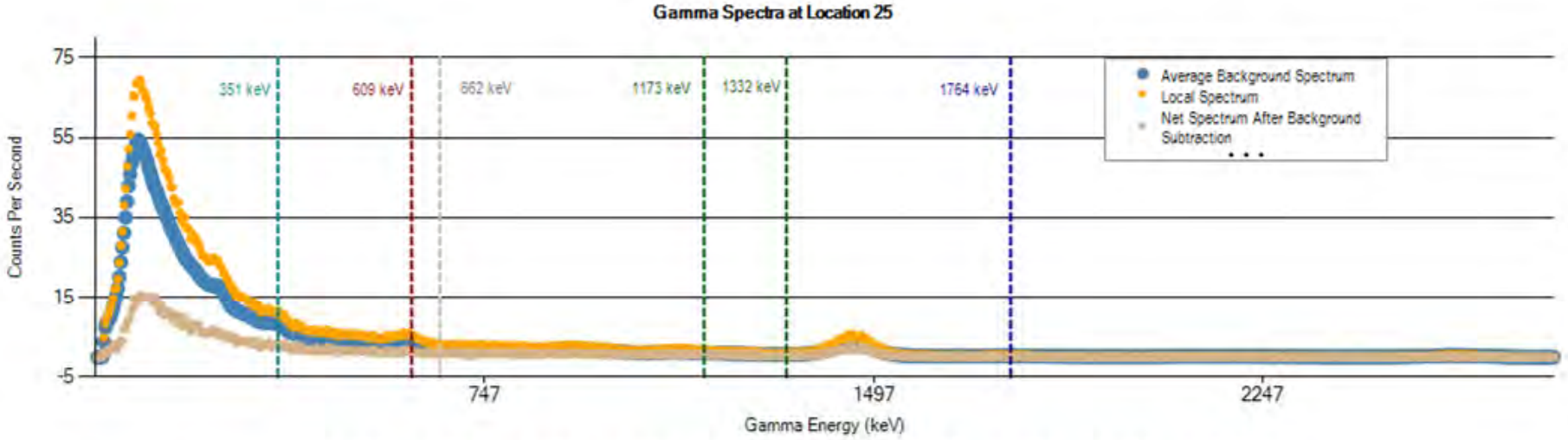
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 23 (cps)	**1102**	**160**	24	26	194	173	137	216	119	**4465**
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



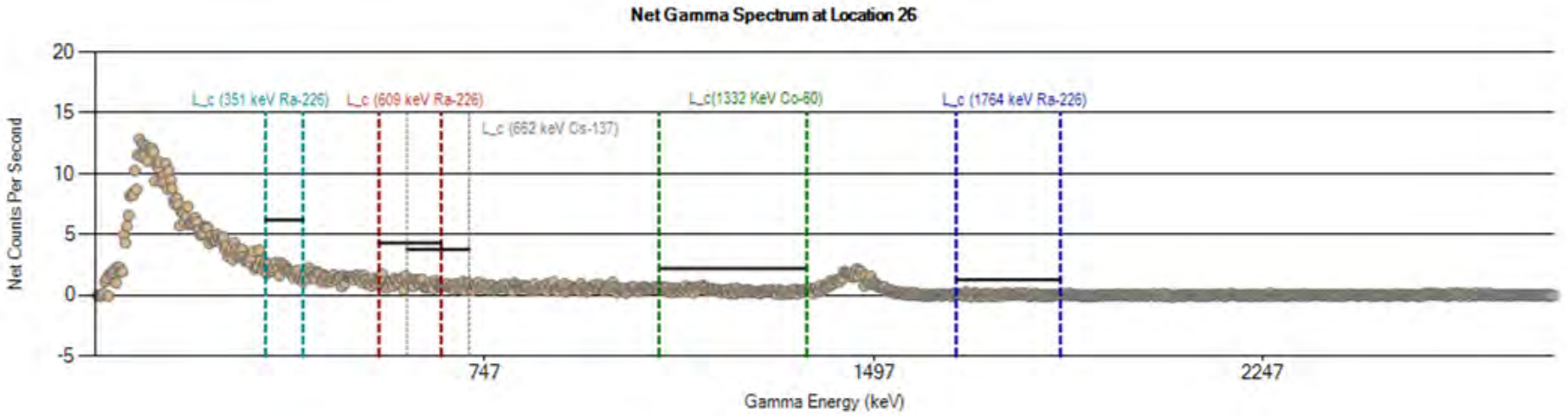


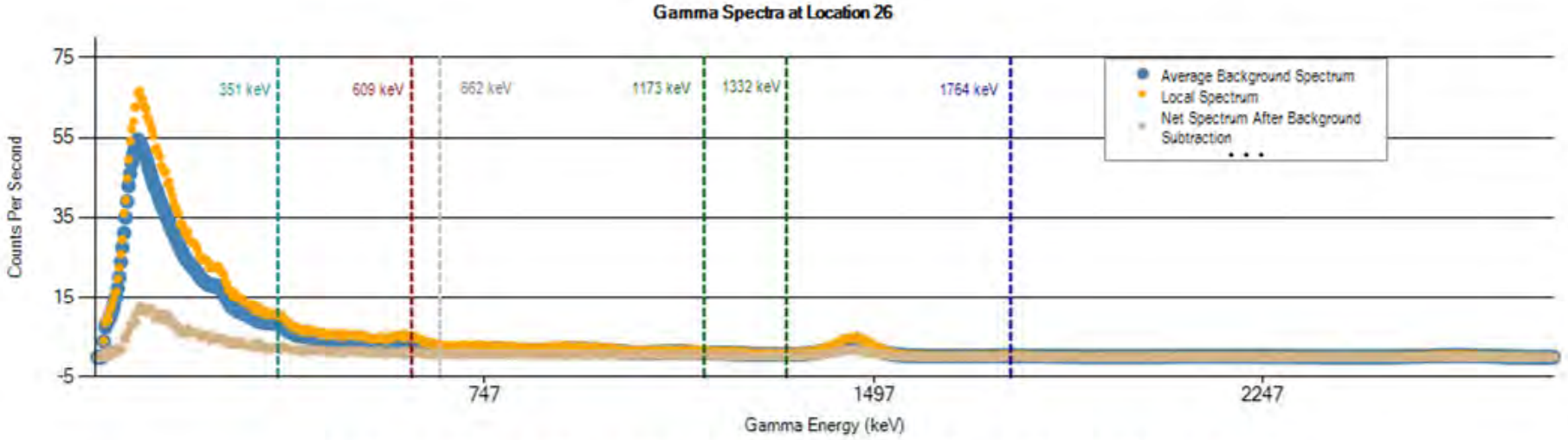
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 24 (cps)	1199	183	26	29	208	187	145	238	131	4752
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255





	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 25 (cps)	1229	189	26	29	208	189	150	239	138	4834
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255





	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 26 (cps)	1157	174	24	28	201	182	143	225	127	4578
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

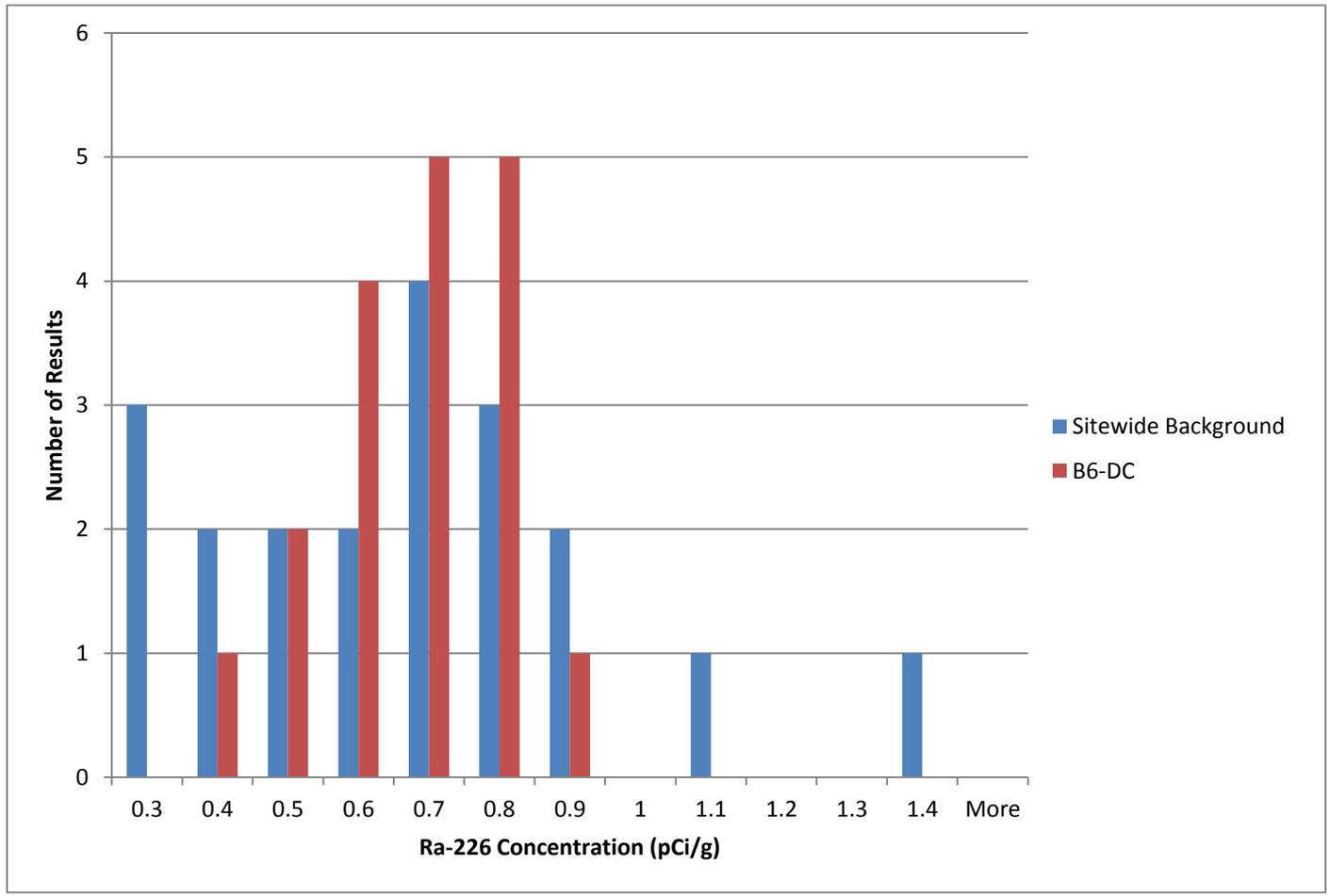
Histogram, RSY B6 (DC) vs. Sitewide Background

Background

Bin	*Frequency*
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

B6-DC

Bin	*Frequency*
0.3	0
0.4	1
0.5	2
0.6	4
0.7	5
0.8	5
0.9	1
1	0
1.1	0
1.2	0
1.3	0
1.4	0
More	0



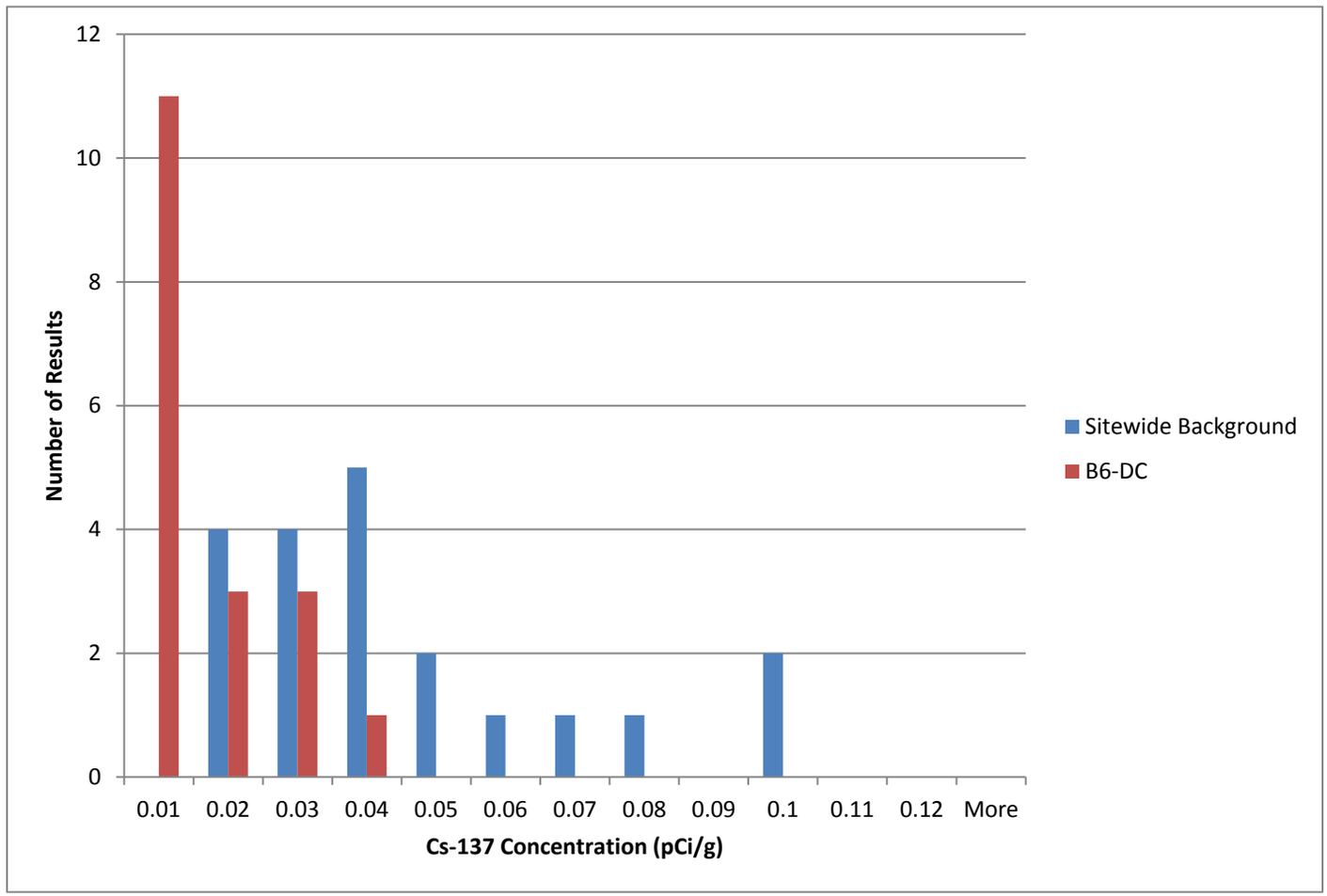
Histogram, RSY B6 (DC) vs. Sitewide Background

Background

Bin	*Frequency*
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

B6-DC

Bin	*Frequency*
0.01	11
0.02	3
0.03	3
0.04	1
0.05	0
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



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ANALYTICAL REPORT

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TestAmerica Job ID: 160-30502-2
Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Micha Korrinhizer

Authorized for release by:
9/28/2018 11:34:59 AM
Micha Korrinhizer, Project Management Assistant II
(314)298-8566
micha.korrinhizer@testamericainc.com

Designee for

Rhonda Ridenhower, Manager of Project Management
(314)298-8566
rhonda.ridenhower@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Job ID: 160-30502-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-30502-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup
Method 3620C: Florisil Cleanup
Method 3630C: Silica Gel Cleanup
Method 3640A: Gel-Permeation Cleanup
Method 3650B: Acid-Base Partition Cleanup
Method 3660B: Sulfur Cleanup
Method 3665A: Sulfuric Acid/Permanganate Cleanup

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Job ID: 160-30502-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT
The samples were received on 08/31/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 21.0° C.

TOTAL BETA STRONTIUM (GFPC)
Samples PE2-RSYB6-DC-S001 (160-30502-1) and PE2-RSYB6-DC-S011 (160-30502-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 09/04/2018, prepared on 09/06/2018 and analyzed on 09/24/2018.

The following samples in batch 160-387711 could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: PE2-RSYB6-DC-S001 (160-30502-1) and PE2-RSYB6-DC-S011 (160-30502-11). The samples contained detritus material and rocks of varying sizes.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)
Samples PE2-RSYB6-DC-S001 (160-30502-1), PE2-RSYB6-DC-S002 (160-30502-2), PE2-RSYB6-DC-S003 (160-30502-3), PE2-RSYB6-DC-S004 (160-30502-4), PE2-RSYB6-DC-S005 (160-30502-5), PE2-RSYB6-DC-S006 (160-30502-6), PE2-RSYB6-DC-S007 (160-30502-7), PE2-RSYB6-DC-S008 (160-30502-8), PE2-RSYB6-DC-S009 (160-30502-9), PE2-RSYB6-DC-S010 (160-30502-10), PE2-RSYB6-DC-S011 (160-30502-11), PE2-RSYB6-DC-S012 (160-30502-12), PE2-RSYB6-DC-S013 (160-30502-13), PE2-RSYB6-DC-S014 (160-30502-14), PE2-RSYB6-DC-S015 (160-30502-15), PE2-RSYB6-DC-S016 (160-30502-16), PE2-RSYB6-DC-S017 (160-30502-17) and PE2-RSYB6-DC-S018 (160-30502-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 09/04/2018, prepared on 09/05/2018 and analyzed on 09/26/2018 and 09/27/2018.

The following samples in batch 160-387208 exhibited a negative result greater in magnitude than the 3 sigma TPU: PE2-RSYB6-DC-S002 (160-30502-2) and (160-30502-A-1-E DU). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The cesium-137 detection goal of 0.0700 pCi/g was not met for samples PE2-RSYB6-DC-S003 (160-30502-3), PE2-RSYB6-DC-S008 (160-30502-8), PE2-RSYB6-DC-S011 (160-30502-11) and PE2-RSYB6-DC-S013 (160-30502-13) in batch 160-387208. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

APTIM

CHAIN OF CUSTODY

Ref. Document # PE2_RSYB6_DC#592

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APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: *Nels Johnson*
(Name & phone #)

Send Report To: *Eddie Kalombo*
Phone/Fax Number: *415-987-0760*
Address: *4005 Port Chicago Hwy*
City: *Concord, CA, 94520*
Sampler's Name(s): Joaquin Ramirez

Project Number: 500506
Project Name: CTO-013 RSYB6 Deconstruction Systematic
Project Location: HPNS - Parcel E-2
Purchase Order #: 202296
Shipment/Pickup Date: 8.30.18
Waybill Number: 1266V5451397901952
Lab Destination: TestAmerica (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63045
Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Sample ID Number	Sample Description	Collection Information: Date	Time	Method	Matrix	# of containers	Preservative (water) / Preservative (soil) / Container Type	Analyses Requested: Gamma Spec (EPA 191.1 M) - (7 day in-growth preliminary results and full 21 day in growth for full gamma results)	Total Strontium (EPA 905 MOD)		Strontium 90 (EPA 905 MOD)			Dose Rate µR/Hr
							Preservative (water)							
							Preservative (soil)	N/A	N/A		N/A			
							Container Type							
PE2-RSYB6-DC-S001	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	0950	G	SO	1	16 oz. plastic jar	X	X		X			5
PE2-RSYB6-DC-S002	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	0952	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYB6-DC-S003	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	0945	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYB6-DC-S004	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1020	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYB6-DC-S005	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1026	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYB6-DC-S006	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1001	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYB6-DC-S007	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	0938	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYB6-DC-S008	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1032	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYB6-DC-S009	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1038	G	SO	1	16 oz. plastic jar	X						5
PE2-RSYB6-DC-S010	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1044	G	SO	1	16 oz. plastic jar	X						5

Special Instructions:
7 days ingrown draft and follow with 21 days final.
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

☐ 24-hr
Standard TAT -10-day ☐ 3-day ☐ 10-day

Level Of QC Required: I II III Project Specific:

Relinquished By	Date / Time	Received By	Date / Time
Joaquin Ramirez	8.27.18 1500	Eddie Kalombo	8.27.18 1500
Eddie Kalombo	8.30.18 1600	Nicholas Chen	8/31/18 0815

Method Codes: C = Composite, G = Grab

Matrix Codes: DW = Drinking Water, GW = Ground Water, WW = Waste Water, A = Air, SO = Soil, SL = Sludge, CP = Chip Samples

ABS=Asbestos, PO=Pipe Openning

160-30502 Chain of Custody

APTIM

CHAIN OF CUSTODY

Ref. Document # PE2_RSYB6_DC#592

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APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 500506
Project Name: CTO-013 RSYB6 Deconstruction Systematic
Project Location: HPNS - Parcel E-2
Purchase Order #: 202296
Shipment/Pickup Date: 8.30.18
Waybill Number: 1266 5451 3 9790 1952
Lab Destination: TestAmerica (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63045
Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Project Manager: *Nels Johnson*
(Name & phone #)

Send Report To: *Eddie Kalombo*
Phone/Fax Number: *415-987-0760*
Address: *4005 Port Chicago Hwy*
City: *Concord, CA, 94520*
Sampler's Name(s): JOAQUIN RAMIREZ

Sample ID Number	Sample Description	Collection Information: Date	Time	Method	Matrix	# of containers	Preservative (water) / Preservative (soil) / Container Type	Analyses Requested: Gamma Spec (EPA 191.1 M) (7 day in-growth preliminary results and full 21 day in growth for full gamma results)	Total Strontium (EPA 905 MOD)		Strontium 90 (EPA 905 MOD)			Dose Rate µR/Hr	
							Preservative (water)								
							Preservative (soil)	N/A	N/A		N/A				
							Container Type								
PE2-RSYB6-DC-S011	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1007	G	SO	1	16 oz. plastic jar	X	X		X			5	
PE2-RSYB6-DC-S012	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1051	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-S013	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1058	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-S014	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1105	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-S015	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1112	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-S016	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1013	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-S017	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1119	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-S018	Parcel E-2 RSYB6 Deconstruction Systematic	8/27/18	1125	G	SO	1	16 oz. plastic jar	X						5	

Special Instructions:
7 days ingrown draft and follow with 21 days final.
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

☐ 24-hr
Standard TAT -10-day ☐ 3-day ☐ 10-day

Level Of QC Required: I II III Project Specific:

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
JOAQUIN RAMIREZ	8.27.18	1500	EDDIE KALOMBO	8.27.18	1500
EDDIE KALOMBO	8.30.18	1600	Nicholas Drew	8-31-18	0845

Method Codes C = Composite G = Grab

Matrix Codes
DW = Drinking Water SO = Soil
GW = Ground Water SL = Sludge
WW = Waste Water CP = Chip Samples
A = Air ABS=Asbestos, PO=Pipe Openning

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-30502-2

Login Number: 30502
List Number: 1
Creator: Press, Nicholas B

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-30502-1	PE2-RSYB6-DC-S001	Solid	08/27/18 08:50	08/31/18 08:45
160-30502-2	PE2-RSYB6-DC-S002	Solid	08/27/18 09:52	08/31/18 08:45
160-30502-3	PE2-RSYB6-DC-S003	Solid	08/27/18 09:45	08/31/18 08:45
160-30502-4	PE2-RSYB6-DC-S004	Solid	08/27/18 10:20	08/31/18 08:45
160-30502-5	PE2-RSYB6-DC-S005	Solid	08/27/18 10:26	08/31/18 08:45
160-30502-6	PE2-RSYB6-DC-S006	Solid	08/27/18 10:01	08/31/18 08:45
160-30502-7	PE2-RSYB6-DC-S007	Solid	08/27/18 09:38	08/31/18 08:45
160-30502-8	PE2-RSYB6-DC-S008	Solid	08/27/18 10:32	08/31/18 08:45
160-30502-9	PE2-RSYB6-DC-S009	Solid	08/27/18 10:38	08/31/18 08:45
160-30502-10	PE2-RSYB6-DC-S010	Solid	08/27/18 10:44	08/31/18 08:45
160-30502-11	PE2-RSYB6-DC-S011	Solid	08/27/18 10:07	08/31/18 08:45
160-30502-12	PE2-RSYB6-DC-S012	Solid	08/27/18 10:51	08/31/18 08:45
160-30502-13	PE2-RSYB6-DC-S013	Solid	08/27/18 10:58	08/31/18 08:45
160-30502-14	PE2-RSYB6-DC-S014	Solid	08/27/18 11:05	08/31/18 08:45
160-30502-15	PE2-RSYB6-DC-S015	Solid	08/27/18 11:12	08/31/18 08:45
160-30502-16	PE2-RSYB6-DC-S016	Solid	08/27/18 10:13	08/31/18 08:45
160-30502-17	PE2-RSYB6-DC-S017	Solid	08/27/18 11:19	08/31/18 08:45
160-30502-18	PE2-RSYB6-DC-S018	Solid	08/27/18 11:25	08/31/18 08:45

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S001

Lab Sample ID: 160-30502-1
Date Collected: 08/27/18 08:50
Matrix: Solid
Date Received: 08/31/18 08:45

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.00901	U	0.0525	0.0525	0.331	0.0441	pCi/g	09/06/18 14:25	09/24/18 04:27	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*85.5*		*40 - 110*	*09/06/18 14:25*	*09/24/18 04:27*	*1*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.905**		0.350	0.362		0.140	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Actinium-227	0.196	U	0.430	0.430		0.340	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Bismuth-212	0.355	U	0.889	0.890		0.699	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Bismuth-214	**0.768**		0.169	0.187		0.0662	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Cesium-137	0.0195	U	0.0755	0.0755	0.0700	0.0602	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Cobalt-60	**0.0785**		0.0472	0.0478	0.200	0.0148	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Lead-210	0.151	U	1.65	1.65		1.15	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Lead-212	**0.717**		0.118	0.150		0.0519	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Lead-214	**0.823**		0.157	0.179		0.0592	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Potassium-40	**16.9**		2.11	2.73		0.263	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Protactinium-231	-1.06	U	3.51	3.51		2.86	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Radium-226	**0.768**		0.169	0.187	0.700	0.0662	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Radium-228	**0.905**		0.350	0.362		0.140	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Thallium-208	**0.318**		0.0831	0.0894		0.0246	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Thorium-228	**0.717**		0.118	0.150		0.0519	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Thorium-232	**0.905**		0.350	0.362		0.140	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Thorium-234	-0.347	U	0.688	0.689		0.958	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Uranium-235	-0.0149	U	0.0211	0.0212		0.331	pCi/g	09/05/18 12:34	09/27/18 10:45	1
Uranium-238	-0.347	U	0.688	0.689		0.958	pCi/g	09/05/18 12:34	09/27/18 10:45	1

Client Sample ID: PE2-RSYB6-DC-S002

Lab Sample ID: 160-30502-2
Date Collected: 08/27/18 09:52
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.745**		0.228	0.240		0.120	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Actinium-227	0.167	U	0.284	0.284		0.503	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Bismuth-212	0.466	U	0.820	0.821		0.625	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Bismuth-214	**0.704**		0.152	0.168		0.0389	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Cesium-137	-0.00128	U	0.164	0.164	0.0700	0.0610	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Cobalt-60	**0.0366**		0.0299	0.0301	0.200	0.0142	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Lead-210	-3.05	U	1.68	1.72		2.33	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Lead-212	**0.563**		0.124	0.137		0.0678	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Lead-214	**0.836**		0.154	0.176		0.0763	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Potassium-40	**14.6**		1.95	2.44		0.388	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Protactinium-231	1.03	U	3.69	3.69		3.01	pCi/g	09/05/18 12:34	09/26/18 07:38	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S002

Lab Sample ID: 160-30502-2
Date Collected: 08/27/18 09:52
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.704**		0.152	0.168	0.700	0.0389	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Radium-228	**0.745**		0.228	0.240		0.120	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Thallium-208	**0.312**		0.0905	0.0959		0.0306	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Thorium-228	**0.563**		0.124	0.137		0.0678	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Thorium-232	**0.745**		0.228	0.240		0.120	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Thorium-234	0.501	U	0.697	0.699		0.547	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Uranium-235	-0.290	U	0.378	0.379		0.617	pCi/g	09/05/18 12:34	09/26/18 07:38	1
Uranium-238	0.501	U	0.697	0.699		0.547	pCi/g	09/05/18 12:34	09/26/18 07:38	1

Client Sample ID: PE2-RSYB6-DC-S003

Lab Sample ID: 160-30502-3
Date Collected: 08/27/18 09:45
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.641**		0.215	0.225		0.106	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Actinium-227	0.118	U	0.255	0.255		0.446	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Bismuth-212	0.247	U	0.525	0.526		0.395	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Bismuth-214	**0.590**		0.147	0.159		0.0462	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Cesium-137	-0.0762	U	0.140	0.141	0.0700	0.0731	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Cobalt-60	**0.0230**		0.0206	0.0207	0.200	0.0139	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Lead-210	0.320	U	1.74	1.74		1.42	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Lead-212	**0.645**		0.108	0.136		0.0448	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Lead-214	**0.548**		0.110	0.124		0.0621	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Potassium-40	**12.5**		1.77	2.18		0.244	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Protactinium-231	0.721	U	2.71	2.71		2.21	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Radium-226	**0.590**		0.147	0.159	0.700	0.0462	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Radium-228	**0.641**		0.215	0.225		0.106	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Thallium-208	**0.218**		0.0676	0.0713		0.0244	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Thorium-228	**0.645**		0.108	0.136		0.0448	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Thorium-232	**0.641**		0.215	0.225		0.106	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Thorium-234	-0.890	U	0.998	1.00		1.18	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Uranium-235	-0.269	U	0.282	0.283		0.470	pCi/g	09/05/18 12:34	09/26/18 07:39	1
Uranium-238	-0.890	U	0.998	1.00		1.18	pCi/g	09/05/18 12:34	09/26/18 07:39	1

Client Sample ID: PE2-RSYB6-DC-S004

Lab Sample ID: 160-30502-4
Date Collected: 08/27/18 10:20
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.617**		0.214	0.223		0.0425	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Actinium-227	0.160	U	0.439	0.439		0.353	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Bismuth-212	0.0580	U	0.829	0.829		0.676	pCi/g	09/05/18 12:34	09/26/18 07:45	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S004

Lab Sample ID: 160-30502-4
Date Collected: 08/27/18 10:20
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	**0.477**		0.134	0.143		0.0376	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Cesium-137	0.00725	U	0.0812	0.0812	0.0700	0.0660	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Cobalt-60	0.0115	U	0.0506	0.0506	0.200	0.0416	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Lead-210	-0.0398	U	1.45	1.45		1.03	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Lead-212	**0.580**		0.110	0.134		0.0437	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Lead-214	**0.385**		0.120	0.127		0.0713	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Potassium-40	**10.8**		1.82	2.13		0.301	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Protactinium-231	0.000	U	0.207	0.207		2.19	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Radium-226	**0.477**		0.134	0.143	0.700	0.0376	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Radium-228	**0.617**		0.214	0.223		0.0425	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Thallium-208	**0.183**		0.0710	0.0735		0.0263	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Thorium-228	**0.580**		0.110	0.134		0.0437	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Thorium-232	**0.617**		0.214	0.223		0.0425	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Thorium-234	-0.759	U	0.618	0.624		0.922	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Uranium-235	-0.210	U	0.336	0.337		0.358	pCi/g	09/05/18 12:34	09/26/18 07:45	1
Uranium-238	-0.759	U	0.618	0.624		0.922	pCi/g	09/05/18 12:34	09/26/18 07:45	1

Client Sample ID: PE2-RSYB6-DC-S005

Lab Sample ID: 160-30502-5
Date Collected: 08/27/18 10:26
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.596**		0.233	0.241		0.0955	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Actinium-227	-0.238	U	1.06	1.06		0.340	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Bismuth-212	-0.103	U	0.468	0.468		0.587	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Bismuth-214	**0.690**		0.146	0.163		0.0533	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Cesium-137	0.0337	U	0.0596	0.0597	0.0700	0.0468	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Cobalt-60	0.00598	U	0.0574	0.0574	0.200	0.0282	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Lead-210	0.310	U	1.60	1.60		1.31	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Lead-212	**0.743**		0.0960	0.136		0.0390	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Lead-214	**0.584**		0.102	0.119		0.0465	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Potassium-40	**16.4**		1.56	2.29		0.215	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Protactinium-231	-0.831	U	2.72	2.72		2.22	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Radium-226	**0.690**		0.146	0.163	0.700	0.0533	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Radium-228	**0.596**		0.233	0.241		0.0955	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Thallium-208	**0.207**		0.0494	0.0539		0.0135	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Thorium-228	**0.743**		0.0960	0.136		0.0390	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Thorium-232	**0.596**		0.233	0.241		0.0955	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Thorium-234	-0.400	U	0.496	0.498		1.07	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Uranium-235	0.000	U	0.0796	0.0796		0.385	pCi/g	09/05/18 12:34	09/26/18 08:20	1
Uranium-238	-0.400	U	0.496	0.498		1.07	pCi/g	09/05/18 12:34	09/26/18 08:20	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S006

Lab Sample ID: 160-30502-6
Date Collected: 08/27/18 10:01
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**1.01**		0.299	0.316		0.159	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Actinium-227	0.240	U	0.460	0.461		0.346	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Bismuth-212	0.572	U	1.00	1.00		0.778	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Bismuth-214	**0.787**		0.176	0.193		0.0515	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Cesium-137	0.00374	U	0.0760	0.0760	0.0700	0.0622	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Cobalt-60	0.0257	U	0.0597	0.0598	0.200	0.0322	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Lead-210	**2.12**		2.30	2.31		1.35	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Lead-212	**0.812**		0.137	0.161		0.0697	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Lead-214	**0.741**		0.158	0.175		0.0747	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Potassium-40	**16.2**		2.00	2.59		0.369	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Protactinium-231	0.392	U	1.91	1.91		2.96	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Radium-226	**0.787**		0.176	0.193	0.700	0.0515	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Radium-228	**1.01**		0.299	0.316		0.159	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Thallium-208	**0.247**		0.0812	0.0850		0.0323	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Thorium-228	**0.812**		0.137	0.161		0.0697	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Thorium-232	**1.01**		0.299	0.316		0.159	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Thorium-234	**1.35**		0.953	0.965		0.556	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Uranium-235	0.219	U	0.500	0.500		0.396	pCi/g	09/05/18 12:34	09/26/18 08:19	1
Uranium-238	**1.35**		0.953	0.965		0.556	pCi/g	09/05/18 12:34	09/26/18 08:19	1

Client Sample ID: PE2-RSYB6-DC-S007

Lab Sample ID: 160-30502-7
Date Collected: 08/27/18 09:38
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.860**		0.232	0.248		0.0658	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Actinium-227	0.213	U	0.461	0.462		0.330	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Bismuth-212	0.442	U	0.805	0.807		0.624	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Bismuth-214	**0.677**		0.147	0.163		0.0462	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Cesium-137	-0.0228	U	0.147	0.147	0.0700	0.0591	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Cobalt-60	**0.0529**		0.0352	0.0356	0.200	0.0125	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Lead-210	**1.30**		1.11	1.12		0.677	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Lead-212	**0.811**		0.118	0.158		0.0535	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Lead-214	**0.691**		0.117	0.138		0.0518	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Potassium-40	**18.0**		1.99	2.71		0.219	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Protactinium-231	0.423	U	1.67	1.67		2.60	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Radium-226	**0.677**		0.147	0.163	0.700	0.0462	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Radium-228	**0.860**		0.232	0.248		0.0658	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Thallium-208	**0.292**		0.0776	0.0834		0.0257	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Thorium-228	**0.811**		0.118	0.158		0.0535	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Thorium-232	**0.860**		0.232	0.248		0.0658	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Thorium-234	**0.591**		0.547	0.551		0.444	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Uranium-235	0.163	U	0.317	0.317		0.268	pCi/g	09/05/18 12:34	09/26/18 08:25	1
Uranium-238	**0.591**		0.547	0.551		0.444	pCi/g	09/05/18 12:34	09/26/18 08:25	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S008

Lab Sample ID: 160-30502-8
Date Collected: 08/27/18 10:32
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**1.02**		0.210	0.234		0.110	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Actinium-227	0.221	U	0.419	0.419		0.389	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Bismuth-212	0.508	U	0.916	0.918		0.706	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Bismuth-214	**0.802**		0.195	0.212		0.0631	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Cesium-137	0.0245	U	0.0894	0.0895	0.0700	0.0716	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Cobalt-60	0.0341	U	0.0736	0.0737	0.200	0.0369	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Lead-210	-0.358	U	1.50	1.50		1.07	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Lead-212	**0.812**		0.122	0.161		0.0472	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Lead-214	**0.758**		0.145	0.165		0.0536	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Potassium-40	**14.7**		1.99	2.50		0.267	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Protactinium-231	-0.940	U	3.30	3.31		2.69	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Radium-226	**0.802**		0.195	0.212	0.700	0.0631	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Radium-228	**1.02**		0.210	0.234		0.110	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Thallium-208	**0.220**		0.0660	0.0698		0.0190	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Thorium-228	**0.812**		0.122	0.161		0.0472	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Thorium-232	**1.02**		0.210	0.234		0.110	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Thorium-234	**0.503**		0.524	0.527		0.425	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Uranium-235	0.184	U	0.371	0.371		0.322	pCi/g	09/05/18 12:34	09/26/18 08:24	1
Uranium-238	**0.503**		0.524	0.527		0.425	pCi/g	09/05/18 12:34	09/26/18 08:24	1

Client Sample ID: PE2-RSYB6-DC-S009

Lab Sample ID: 160-30502-9
Date Collected: 08/27/18 10:38
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.634**		0.172	0.184		0.0429	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Actinium-227	0.0937	U	0.145	0.146		0.335	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Bismuth-212	**0.960**		0.451	0.462		0.205	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Bismuth-214	**0.394**		0.154	0.159		0.150	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Cesium-137	0.0254	U	0.0441	0.0442	0.0700	0.0340	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Cobalt-60	**0.0273**		0.0206	0.0207	0.200	0.0192	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Lead-210	-0.510	U	1.65	1.65		1.02	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Lead-212	**0.677**		0.0909	0.126		0.0379	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Lead-214	**0.647**		0.106	0.126		0.0558	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Potassium-40	**14.3**		1.44	2.05		0.208	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Protactinium-231	-0.803	U	2.59	2.59		2.12	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Radium-226	**0.394**		0.154	0.159	0.700	0.150	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Radium-228	**0.634**		0.172	0.184		0.0429	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Thallium-208	**0.206**		0.0557	0.0596		0.0189	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Thorium-228	**0.677**		0.0909	0.126		0.0379	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Thorium-232	**0.634**		0.172	0.184		0.0429	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Thorium-234	0.352	U	1.19	1.20		0.978	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Uranium-235	0.000	U	0.161	0.161		0.378	pCi/g	09/05/18 12:34	09/26/18 09:18	1
Uranium-238	0.352	U	1.19	1.20		0.978	pCi/g	09/05/18 12:34	09/26/18 09:18	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S010

Lab Sample ID: 160-30502-10
Date Collected: 08/27/18 10:44
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**1.09**		0.187	0.217		0.0661	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Actinium-227	0.170	U	0.598	0.598		0.365	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Bismuth-212	-0.262	U	0.976	0.976		0.785	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Bismuth-214	**0.813**		0.156	0.177		0.0428	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Cesium-137	0.0346	U	0.0645	0.0646	0.0700	0.0500	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Cobalt-60	-0.0195	U	0.0964	0.0964	0.200	0.0469	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Lead-210	0.0904	U	1.45	1.45		1.08	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Lead-212	**0.857**		0.126	0.155		0.0596	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Lead-214	**0.889**		0.162	0.185		0.0583	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Potassium-40	**20.0**		1.98	2.83		0.115	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Protactinium-231	-0.993	U	3.57	3.57		2.91	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Radium-226	**0.813**		0.156	0.177	0.700	0.0428	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Radium-228	**1.09**		0.187	0.217		0.0661	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Thallium-208	**0.332**		0.0909	0.0969		0.0317	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Thorium-228	**0.857**		0.126	0.155		0.0596	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Thorium-232	**1.09**		0.187	0.217		0.0661	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Thorium-234	0.496	U	0.690	0.692		0.537	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Uranium-235	0.127	U	0.254	0.254		0.576	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Uranium-238	0.496	U	0.690	0.692		0.537	pCi/g	09/05/18 12:34	09/26/18 09:24	1

Client Sample ID: PE2-RSYB6-DC-S011

Lab Sample ID: 160-30502-11
Date Collected: 08/27/18 10:07
Matrix: Solid
Date Received: 08/31/18 08:45

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	**0.138**		0.0766	0.0772	0.331	0.0524	pCi/g	09/06/18 14:25	09/24/18 04:27	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*83.8*		*40 - 110*	*09/06/18 14:25*	*09/24/18 04:27*	*1*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.920**		0.380	0.391		0.160	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Actinium-227	0.240	U	0.559	0.559		0.469	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Bismuth-212	0.629	U	1.02	1.02		0.789	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Bismuth-214	**0.938**		0.209	0.230		0.0637	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Cesium-137	-0.0354	U	0.115	0.115	0.0700	0.0882	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Cobalt-60	-0.0815	U	0.165	0.165	0.200	0.0791	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Lead-210	-1.76	U	1.77	1.78		2.00	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Lead-212	**0.896**		0.135	0.164		0.0598	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Lead-214	**0.837**		0.158	0.180		0.0871	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Potassium-40	**18.8**		2.15	2.87		0.370	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Protactinium-231	-1.05	U	3.82	3.82		3.12	pCi/g	09/05/18 12:34	09/26/18 09:19	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S011

Lab Sample ID: 160-30502-11
Date Collected: 08/27/18 10:07
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.938**		0.209	0.230	0.700	0.0637	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Radium-228	**0.920**		0.380	0.391		0.160	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Thallium-208	**0.453**		0.0905	0.102		0.0190	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Thorium-228	**0.896**		0.135	0.164		0.0598	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Thorium-232	**0.920**		0.380	0.391		0.160	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Thorium-234	**1.21**		0.721	0.733		0.494	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Uranium-235	-0.0228	U	0.401	0.401		0.709	pCi/g	09/05/18 12:34	09/26/18 09:19	1
Uranium-238	**1.21**		0.721	0.733		0.494	pCi/g	09/05/18 12:34	09/26/18 09:19	1

Client Sample ID: PE2-RSYB6-DC-S012

Lab Sample ID: 160-30502-12
Date Collected: 08/27/18 10:51
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.791**		0.198	0.214		0.0342	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Actinium-227	0.252	U	0.581	0.582		0.364	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Bismuth-212	0.335	U	0.890	0.891		0.704	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Bismuth-214	**0.551**		0.150	0.160		0.0588	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Cesium-137	0.0136	U	0.0733	0.0733	0.0700	0.0440	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Cobalt-60	**0.0429**		0.0579	0.0580	0.200	0.0318	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Lead-210	-1.00	U	2.18	2.18		1.76	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Lead-212	**0.623**		0.164	0.183		0.113	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Lead-214	**0.725**		0.147	0.165		0.0545	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Potassium-40	**13.4**		1.82	2.28		0.241	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Protactinium-231	-1.13	U	3.59	3.59		2.93	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Radium-226	**0.551**		0.150	0.160	0.700	0.0588	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Radium-228	**0.791**		0.198	0.214		0.0342	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Thallium-208	**0.179**		0.0645	0.0671		0.0261	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Thorium-228	**0.623**		0.164	0.183		0.113	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Thorium-232	**0.791**		0.198	0.214		0.0342	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Thorium-234	**0.522**		0.595	0.597		0.497	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Uranium-235	-0.254	U	0.340	0.341		0.461	pCi/g	09/05/18 12:34	09/26/18 09:23	1
Uranium-238	**0.522**		0.595	0.597		0.497	pCi/g	09/05/18 12:34	09/26/18 09:23	1

Client Sample ID: PE2-RSYB6-DC-S013

Lab Sample ID: 160-30502-13
Date Collected: 08/27/18 10:58
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.834**		0.220	0.236		0.0786	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Actinium-227	0.0256	U	0.0473	0.0475		0.490	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Bismuth-212	0.0185	U	1.02	1.02		0.836	pCi/g	09/05/18 12:34	09/26/18 09:25	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S013

Lab Sample ID: 160-30502-13
Matrix: Solid
Date Collected: 08/27/18 10:58
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	**0.525**		0.159	0.168		0.0584	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Cesium-137	-0.0733	U	0.0965	0.0968	0.0700	0.0952	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Cobalt-60	0.0140	U	0.0777	0.0777	0.200	0.0398	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Lead-210	**1.03**		1.49	1.50		1.01	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Lead-212	**0.719**		0.116	0.148		0.0392	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Lead-214	**0.590**		0.152	0.164		0.0709	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Potassium-40	**15.6**		2.13	2.66		0.288	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Protactinium-231	0.000	U	0.397	0.397		2.56	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Radium-226	**0.525**		0.159	0.168	0.700	0.0584	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Radium-228	**0.834**		0.220	0.236		0.0786	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Thallium-208	**0.323**		0.0857	0.0920		0.0233	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Thorium-228	**0.719**		0.116	0.148		0.0392	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Thorium-232	**0.834**		0.220	0.236		0.0786	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Thorium-234	**0.955**		0.615	0.624		0.451	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Uranium-235	0.102	U	0.213	0.213		0.393	pCi/g	09/05/18 12:34	09/26/18 09:25	1
Uranium-238	**0.955**		0.615	0.624		0.451	pCi/g	09/05/18 12:34	09/26/18 09:25	1

Client Sample ID: PE2-RSYB6-DC-S014

Lab Sample ID: 160-30502-14
Matrix: Solid
Date Collected: 08/27/18 11:05
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.597**		0.354	0.359		0.154	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Actinium-227	-0.425	U	0.798	0.800		0.480	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Bismuth-212	0.412	U	0.934	0.935		0.729	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Bismuth-214	**0.625**		0.166	0.178		0.0582	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Cesium-137	-0.0393	U	0.0820	0.0821	0.0700	0.0639	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Cobalt-60	0.0307	U	0.0280	0.0282	0.200	0.0530	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Lead-210	-0.173	U	1.90	1.90		1.57	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Lead-212	**0.623**		0.122	0.146		0.0591	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Lead-214	**0.632**		0.152	0.165		0.0689	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Potassium-40	**9.39**		1.62	1.89		0.163	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Protactinium-231	0.642	U	2.56	2.56		2.74	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Radium-226	**0.625**		0.166	0.178	0.700	0.0582	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Radium-228	**0.597**		0.354	0.359		0.154	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Thallium-208	**0.183**		0.0677	0.0703		0.0273	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Thorium-228	**0.623**		0.122	0.146		0.0591	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Thorium-232	**0.597**		0.354	0.359		0.154	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Thorium-234	-0.361	U	1.47	1.47		1.22	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Uranium-235	-0.208	U	0.511	0.512		0.414	pCi/g	09/05/18 12:34	09/26/18 09:24	1
Uranium-238	-0.361	U	1.47	1.47		1.22	pCi/g	09/05/18 12:34	09/26/18 09:24	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S015

Lab Sample ID: 160-30502-15
Date Collected: 08/27/18 11:12
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.490**		0.130	0.139		0.0752	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Actinium-227	0.165	U	0.357	0.358		0.289	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Bismuth-212	0.130	U	0.601	0.602		0.481	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Bismuth-214	**0.640**		0.155	0.169		0.0495	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Cesium-137	0.0218	U	0.0393	0.0394	0.0700	0.0297	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Cobalt-60	0.0133	U	0.0456	0.0456	0.200	0.0234	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Lead-210	-0.755	U	1.46	1.47		1.17	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Lead-212	**0.476**		0.0908	0.110		0.0448	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Lead-214	**0.597**		0.133	0.147		0.0526	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Potassium-40	**11.5**		1.43	1.86		0.253	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Protactinium-231	0.000	U	0.514	0.514		1.99	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Radium-226	**0.640**		0.155	0.169	0.700	0.0495	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Radium-228	**0.490**		0.130	0.139		0.0752	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thallium-208	**0.119**		0.0703	0.0714		0.0325	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thorium-228	**0.476**		0.0908	0.110		0.0448	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thorium-232	**0.490**		0.130	0.139		0.0752	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thorium-234	-0.00745	U	0.454	0.454		0.937	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Uranium-235	-0.0508	U	0.239	0.239		0.194	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Uranium-238	-0.00745	U	0.454	0.454		0.937	pCi/g	09/05/18 12:34	09/26/18 10:07	1

Client Sample ID: PE2-RSYB6-DC-S016

Lab Sample ID: 160-30502-16
Date Collected: 08/27/18 10:13
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.878**		0.211	0.229		0.114	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Actinium-227	0.0530	U	0.138	0.138		0.453	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Bismuth-212	0.000	U	0.658	0.658		0.840	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Bismuth-214	**0.781**		0.164	0.182		0.0436	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Cesium-137	0.0385	U	0.0713	0.0714	0.0700	0.0556	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Cobalt-60	-0.0226	U	0.110	0.110	0.200	0.0538	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Lead-210	**1.80**		1.54	1.55		1.04	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Lead-212	**0.825**		0.121	0.148		0.0536	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Lead-214	**0.768**		0.188	0.203		0.0806	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Potassium-40	**17.1**		1.83	2.51		0.114	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Protactinium-231	0.415	U	1.69	1.69		2.64	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Radium-226	**0.781**		0.164	0.182	0.700	0.0436	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Radium-228	**0.878**		0.211	0.229		0.114	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thallium-208	**0.290**		0.0807	0.0859		0.0285	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thorium-228	**0.825**		0.121	0.148		0.0536	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thorium-232	**0.878**		0.211	0.229		0.114	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thorium-234	**1.57**		0.757	0.777		0.476	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Uranium-235	0.273	U	0.361	0.362		0.374	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Uranium-238	**1.57**		0.757	0.777		0.476	pCi/g	09/05/18 12:34	09/26/18 10:07	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Client Sample ID: PE2-RSYB6-DC-S017

Lab Sample ID: 160-30502-17

Date Collected: 08/27/18 11:19
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.281**		0.359	0.360		0.225	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Actinium-227	-0.440	U	0.917	0.918		0.557	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Bismuth-212	0.344	U	0.966	0.967		0.767	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Bismuth-214	**0.713**		0.158	0.174		0.0609	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Cesium-137	-0.0235	U	0.0638	0.0638	0.0700	0.0653	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Cobalt-60	-0.0175	U	0.115	0.115	0.200	0.0561	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Lead-210	-0.827	U	2.03	2.04		1.42	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Lead-212	**0.707**		0.131	0.151		0.0689	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Lead-214	**0.841**		0.163	0.184		0.0786	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Potassium-40	**17.7**		2.09	2.75		0.372	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Protactinium-231	0.693	U	2.25	2.25		2.46	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Radium-226	**0.713**		0.158	0.174	0.700	0.0609	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Radium-228	**0.281**		0.359	0.360		0.225	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thallium-208	**0.327**		0.0895	0.0955		0.0308	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thorium-228	**0.707**		0.131	0.151		0.0689	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thorium-232	**0.281**		0.359	0.360		0.225	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Thorium-234	-1.07	U	0.780	0.789		1.15	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Uranium-235	0.169	U	0.424	0.425		0.342	pCi/g	09/05/18 12:34	09/26/18 10:07	1
Uranium-238	-1.07	U	0.780	0.789		1.15	pCi/g	09/05/18 12:34	09/26/18 10:07	1

Client Sample ID: PE2-RSYB6-DC-S018

Lab Sample ID: 160-30502-18

Date Collected: 08/27/18 11:25
Matrix: Solid
Date Received: 08/31/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.917**		0.252	0.269		0.135	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Actinium-227	0.144	U	0.312	0.312		0.477	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Bismuth-212	0.575	U	0.993	0.995		0.770	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Bismuth-214	**0.734**		0.158	0.175		0.0529	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Cesium-137	-0.0473	U	0.0966	0.0967	0.0700	0.0667	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Cobalt-60	**0.0418**		0.0419	0.0421	0.200	0.0335	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Lead-210	0.293	U	2.05	2.05		1.67	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Lead-212	**0.816**		0.122	0.161		0.0480	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Lead-214	**0.707**		0.140	0.159		0.0639	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Potassium-40	**14.2**		1.92	2.40		0.255	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Protactinium-231	0.755	U	2.25	2.25		2.46	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Radium-226	**0.734**		0.158	0.175	0.700	0.0529	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Radium-228	**0.917**		0.252	0.269		0.135	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Thallium-208	**0.203**		0.0697	0.0728		0.0255	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Thorium-228	**0.816**		0.122	0.161		0.0480	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Thorium-232	**0.917**		0.252	0.269		0.135	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Thorium-234	0.418	U	0.556	0.558		0.553	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Uranium-235	-0.0146	U	0.0910	0.0910		0.516	pCi/g	09/05/18 12:34	09/26/18 10:10	1
Uranium-238	0.418	U	0.556	0.558		0.553	pCi/g	09/05/18 12:34	09/26/18 10:10	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-387711/7-A
Matrix: Solid
Analysis Batch: 391110

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 387711

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.003272	U	0.0559	0.0559	0.331	0.0457	pCi/g	09/06/18 14:25	09/24/18 04:27	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*84.6*		*40 - 110*	*09/06/18 14:25*	*09/24/18 04:27*	*1*

Lab Sample ID: LCS 160-387711/1-A
Matrix: Solid
Analysis Batch: 391110

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 387711

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits		
Total Beta Strontium			8.19	7.850		0.640	0.331	0.0480	pCi/g	96	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Sr Carrier	*84.1*		*40 - 110*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-387208/1-A
Matrix: Solid
Analysis Batch: 391288

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 387208

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.1295		0.113	0.114		0.0546	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Actinium-227	0.09723	U	0.269	0.269		0.338	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Bismuth-212	-0.3673	U	0.879	0.879		0.671	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Bismuth-214	0.08238	U	0.205	0.205		0.147	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Cesium-137	-0.03542	U	0.112	0.112	0.0700	0.0648	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Cobalt-60	-0.006229	U	0.141	0.141	0.200	0.0218	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Lead-210	0.4320	U	1.18	1.18		0.831	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Lead-212	0.006764	U	0.0938	0.0938		0.0761	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Lead-214	-0.02007	U	0.130	0.130		0.108	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Potassium-40	-0.4159	U	1.50	1.50		0.639	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Protactinium-231	0.0000	U	0.266	0.266		2.00	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Radium-226	0.08238	U	0.205	0.205	0.700	0.147	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Radium-228	0.1295		0.113	0.114		0.0546	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Thallium-208	0.05133		0.0412	0.0416		0.0294	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Thorium-228	0.006764	U	0.0938	0.0938		0.0761	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Thorium-232	0.1295		0.113	0.114		0.0546	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Thorium-234	0.3387		0.477	0.478		0.323	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Uranium-235	0.03936	U	0.258	0.258		0.208	pCi/g	09/05/18 12:34	09/26/18 06:50	1
Uranium-238	0.3387		0.477	0.478		0.323	pCi/g	09/05/18 12:34	09/26/18 06:50	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-387208/2-A
Matrix: Solid
Analysis Batch: 391262

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 387208

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	98.37		11.6		0.670	pCi/g	102	87 - 116
Cesium-137	28.1	30.85		3.23	0.0700	0.125	pCi/g	110	87 - 120
Cobalt-60	12.7	13.68		1.42	0.200	0.0524	pCi/g	108	87 - 115

Lab Sample ID: 160-30502-1 DU
Matrix: Solid
Analysis Batch: 391262

Client Sample ID: PE2-RSYB6-DC-S001
Prep Type: Total/NA
Prep Batch: 387208

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
Actinium 228	0.905		0.9555		0.203		0.0278	pCi/g	0.09	1
Actinium-227	0.196	U	0.1451	U	0.536		0.374	pCi/g	0.05	1
Bismuth-212	0.355	U	0.5428	U	0.933		0.729	pCi/g	0.10	1
Bismuth-214	0.768		0.7811		0.186		0.0480	pCi/g	0.04	1
Cesium-137	0.0195	U	-0.0002905	U	0.0612	0.0700	0.0504	pCi/g	0.14	1
Cobalt-60	0.0785		0.02294	U	0.0572	0.200	0.0360	pCi/g	0.53	1
Lead-210	0.151	U	2.014		1.69		1.04	pCi/g	0.56	1
Lead-212	0.717		0.7851		0.143		0.0552	pCi/g	0.23	1
Lead-214	0.823		0.8156		0.178		0.0586	pCi/g	0.02	1
Potassium-40	16.9		18.13		2.59		0.108	pCi/g	0.22	1
Protactinium-231	-1.06	U	0.5766	U	3.14		2.57	pCi/g	0.25	1
Radium-226	0.768		0.7811		0.186	0.700	0.0480	pCi/g	0.04	1
Radium-228	0.905		0.9555		0.203		0.0278	pCi/g	0.09	1
Thallium-208	0.318		0.2723		0.0753		0.0239	pCi/g	0.28	1
Thorium-228	0.717		0.7851		0.143		0.0552	pCi/g	0.23	1
Thorium-232	0.905		0.9555		0.203		0.0278	pCi/g	0.09	1
Thorium-234	-0.347	U	-0.9495	U	0.784		1.05	pCi/g	0.41	1
Uranium-235	-0.0149	U	-0.03797	U	0.0755		0.623	pCi/g	0.24	1
Uranium-238	-0.347	U	-0.9495	U	0.784		1.05	pCi/g	0.41	1

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Rad

Leach Batch: 386876

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30502-1	PE2-RSYB6-DC-S001	Total/NA	Solid	Dry and Grind	
160-30502-2	PE2-RSYB6-DC-S002	Total/NA	Solid	Dry and Grind	
160-30502-3	PE2-RSYB6-DC-S003	Total/NA	Solid	Dry and Grind	
160-30502-4	PE2-RSYB6-DC-S004	Total/NA	Solid	Dry and Grind	
160-30502-5	PE2-RSYB6-DC-S005	Total/NA	Solid	Dry and Grind	
160-30502-6	PE2-RSYB6-DC-S006	Total/NA	Solid	Dry and Grind	
160-30502-7	PE2-RSYB6-DC-S007	Total/NA	Solid	Dry and Grind	
160-30502-8	PE2-RSYB6-DC-S008	Total/NA	Solid	Dry and Grind	
160-30502-9	PE2-RSYB6-DC-S009	Total/NA	Solid	Dry and Grind	
160-30502-10	PE2-RSYB6-DC-S010	Total/NA	Solid	Dry and Grind	
160-30502-11	PE2-RSYB6-DC-S011	Total/NA	Solid	Dry and Grind	
160-30502-12	PE2-RSYB6-DC-S012	Total/NA	Solid	Dry and Grind	
160-30502-13	PE2-RSYB6-DC-S013	Total/NA	Solid	Dry and Grind	
160-30502-14	PE2-RSYB6-DC-S014	Total/NA	Solid	Dry and Grind	
160-30502-15	PE2-RSYB6-DC-S015	Total/NA	Solid	Dry and Grind	
160-30502-16	PE2-RSYB6-DC-S016	Total/NA	Solid	Dry and Grind	
160-30502-17	PE2-RSYB6-DC-S017	Total/NA	Solid	Dry and Grind	
160-30502-18	PE2-RSYB6-DC-S018	Total/NA	Solid	Dry and Grind	
160-30502-1 DU	PE2-RSYB6-DC-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 387208

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30502-1	PE2-RSYB6-DC-S001	Total/NA	Solid	Fill_Geo-21	386876
160-30502-2	PE2-RSYB6-DC-S002	Total/NA	Solid	Fill_Geo-21	386876
160-30502-3	PE2-RSYB6-DC-S003	Total/NA	Solid	Fill_Geo-21	386876
160-30502-4	PE2-RSYB6-DC-S004	Total/NA	Solid	Fill_Geo-21	386876
160-30502-5	PE2-RSYB6-DC-S005	Total/NA	Solid	Fill_Geo-21	386876
160-30502-6	PE2-RSYB6-DC-S006	Total/NA	Solid	Fill_Geo-21	386876
160-30502-7	PE2-RSYB6-DC-S007	Total/NA	Solid	Fill_Geo-21	386876
160-30502-8	PE2-RSYB6-DC-S008	Total/NA	Solid	Fill_Geo-21	386876
160-30502-9	PE2-RSYB6-DC-S009	Total/NA	Solid	Fill_Geo-21	386876
160-30502-10	PE2-RSYB6-DC-S010	Total/NA	Solid	Fill_Geo-21	386876
160-30502-11	PE2-RSYB6-DC-S011	Total/NA	Solid	Fill_Geo-21	386876
160-30502-12	PE2-RSYB6-DC-S012	Total/NA	Solid	Fill_Geo-21	386876
160-30502-13	PE2-RSYB6-DC-S013	Total/NA	Solid	Fill_Geo-21	386876
160-30502-14	PE2-RSYB6-DC-S014	Total/NA	Solid	Fill_Geo-21	386876
160-30502-15	PE2-RSYB6-DC-S015	Total/NA	Solid	Fill_Geo-21	386876
160-30502-16	PE2-RSYB6-DC-S016	Total/NA	Solid	Fill_Geo-21	386876
160-30502-17	PE2-RSYB6-DC-S017	Total/NA	Solid	Fill_Geo-21	386876
160-30502-18	PE2-RSYB6-DC-S018	Total/NA	Solid	Fill_Geo-21	386876
MB 160-387208/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-387208/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-30502-1 DU	PE2-RSYB6-DC-S001	Total/NA	Solid	Fill_Geo-21	386876

Prep Batch: 387711

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30502-1	PE2-RSYB6-DC-S001	Total/NA	Solid	DPS-0	386876
160-30502-11	PE2-RSYB6-DC-S011	Total/NA	Solid	DPS-0	386876
MB 160-387711/7-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-387711/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30502-2

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Sr Carrier (40-110)							
160-30502-1	PE2-RSYB6-DC-S001	85.5							
160-30502-11	PE2-RSYB6-DC-S011	83.8							
LCS 160-387711/1-A	Lab Control Sample	84.1							
MB 160-387711/7-A	Method Blank	84.6							

Tracer/Carrier Legend

Sr Carrier = Sr Carrier

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-31043-2
Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Rhonda Ridenhower

Authorized for release by:
10/26/2018 2:38:37 PM

Rhonda Ridenhower, Manager of Project Management
(314)298-8566
rhonda.ridenhower@testamericainc.com

Table of Contents

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Job ID: 160-31043-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-31043-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup
Method 3620C: Florisil Cleanup
Method 3630C: Silica Gel Cleanup
Method 3640A: Gel-Permeation Cleanup
Method 3650B: Acid-Base Partition Cleanup
Method 3660B: Sulfur Cleanup

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Job ID: 160-31043-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT
The samples were received on 10/02/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 19.0 C.

TOTAL BETA STRONTIUM (GFPC)
Sample PE2-RSYB6-DC-B-S001 (160-31043-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/02/2018, prepared on 10/07/2018 and analyzed on 10/25/2018.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: PE2-RSYB6-DC-B-S001 (160-31043-1). The samples contained detritus material and rocks of varying sizes.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)
Samples PE2-RSYB6-DC-B-S001 (160-31043-1), PE2-RSYB6-DC-B-S002 (160-31043-2), PE2-RSYB6-DC-B-S003 (160-31043-3), PE2-RSYB6-DC-B-S004 (160-31043-4), PE2-RSYB6-DC-B-S005 (160-31043-5), PE2-RSYB6-DC-B-S006 (160-31043-6) and PE2-RSYB6-DC-B-S007 (160-31043-7) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/02/2018, prepared on 10/03/2018 and analyzed on 10/24/2018 and 10/25/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. PE2-RSYB6-DC-B-S002 (160-31043-2), PE2-RSYB6-DC-B-S005 (160-31043-5), PE2-RSYB6-DC-B-S007 (160-31043-7) and (160-31039-A-1-E DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

APTIM

CHAIN OF CUSTODY

Ref. Document # PE2_RSYB6_DC_BIASED#616

Page 1 of 1

APTIM
4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: *Nels Johnson* (Name & phone #)

Send Report To: *Eddie Kalombo*
Phone/Fax Number: *415-987-0760*
Address: *4005 Port Chicago Hwy*
City: *Concord, CA, 94520*
Sampler's Name(s): JOAQUIN RAMIREZ

Project Number: 500506
Project Name: CTO-013 RSYB6 Deconstruction biased sample
Project Location: HPNS - Parcel E-2
Purchase Order #: 202296
Shipment/Pickup Date: 10.1.18
Waybill Number: 1266 5451 3978 1 7455
Lab Destination: TestAmerica (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63045
Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Sample ID Number	Sample Description	Collection Information: Date	Time	Method	Matrix	# of containers	Preservative (water) / Preservative (soil) / Container Type	Analyses Requested: Gamma Spec (EPA 191.1 M) (7 day in-growth preliminary results and full 21 day in growth for full gamma results)	Total Strontium (EPA 905 MOD)		Strontium 90 (EPA 905 MOD)			Dose Rate µR/Hr	
							Preservative (water)								
							Preservative (soil)	N/A	N/A		N/A				
							Container Type								
PE2-RSYB6-DC-B-S001	Parcel E-2 RSYB6 Biased	9/13/18	1316	G	SO	1	16 oz. plastic jar	X	X		X			5	
PE2-RSYB6-DC-B-S002	Parcel E-2 RSYB6 Biased	9/13/18	1323	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-B-S003	Parcel E-2 RSYB6 Biased	9/13/18	1330	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-B-S004	Parcel E-2 RSYB6 Biased	9/13/18	1336	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-B-S005	Parcel E-2 RSYB6 Biased	9/13/18	1342	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-B-S006	Parcel E-2 RSYB6 Biased	9/13/18	1349	G	SO	1	16 oz. plastic jar	X						5	
PE2-RSYB6-DC-B-S007	Parcel E-2 RSYB6 Biased	9/13/18	1356	G	SO	1	16 oz. plastic jar	X						5	

Special Instructions:

7 days ingrown draft and follow with 21 days final.
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

☐ 24-hr
Standard TAT -10-day ☐ 3-day ☐ 10-day

Level Of QC Required: I II **III** Project Specific:

Relinquished By:	Date / Time	Received By:	Date / Time
JOAQUIN RAMIREZ	Date: 9-13-18 Time: 1100	Tobin Wells, Toli Wells	Date: 9-13-18 Time: 1100
Tobin Wells Toli Wells	Date: 10.1.18 Time: 1600	Nicholas Kress	Date: 10-2-18 Time: 0840
	Date: Time:		Date: Time:
	Date: Time:		Date: Time:

Method Codes C = Composite G = Grab

Matrix Codes
DW = Drinking Water SO = Soil
GW = Ground Water SL = Sludge
WW = Waste Water CP = Chip Samples
A = Air ABS=Asbestos, PO=Pipe Openning

160-31043 Chain of Custody

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-31043-2

Login Number: 31043
List Number: 1
Creator: Press, Nicholas B

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-31043-1	PE2-RSYB6-DC-B-S001	Solid	09/13/18 13:16	10/02/18 08:40
160-31043-2	PE2-RSYB6-DC-B-S002	Solid	09/13/18 13:23	10/02/18 08:40
160-31043-3	PE2-RSYB6-DC-B-S003	Solid	09/13/18 13:30	10/02/18 08:40
160-31043-4	PE2-RSYB6-DC-B-S004	Solid	09/13/18 13:36	10/02/18 08:40
160-31043-5	PE2-RSYB6-DC-B-S005	Solid	09/13/18 13:42	10/02/18 08:40
160-31043-6	PE2-RSYB6-DC-B-S006	Solid	09/13/18 13:49	10/02/18 08:40
160-31043-7	PE2-RSYB6-DC-B-S007	Solid	09/13/18 13:56	10/02/18 08:40

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Client Sample ID: PE2-RSYB6-DC-B-S001

Lab Sample ID: 160-31043-1
Date Collected: 09/13/18 13:16
Matrix: Solid
Date Received: 10/02/18 08:40

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0276	U	0.0657	0.0657	0.331	0.0562	pCi/g	10/07/18 13:14	10/25/18 05:44	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*87.4*		*40 - 110*	*10/07/18 13:14*	*10/25/18 05:44*	*1*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.924**		0.253	0.270		0.0634	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Actinium-227	0.224	U	0.451	0.451		0.352	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Bismuth-212	0.450	U	0.763	0.764		0.585	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Bismuth-214	**0.628**		0.153	0.166		0.0604	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Cesium-137	-0.0536	U	0.0875	0.0876	0.0700	0.0684	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Cobalt-60	0.0200	U	0.0475	0.0475	0.200	0.0395	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Lead-210	-0.742	U	2.40	2.41		2.00	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Lead-212	**0.671**		0.124	0.142		0.0666	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Lead-214	**0.752**		0.134	0.154		0.0736	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Potassium-40	**16.4**		1.89	2.51		0.246	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Protactinium-231	-0.947	U	3.54	3.54		2.89	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Radium-226	**0.628**		0.153	0.166	0.700	0.0604	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Radium-228	**0.924**		0.253	0.270		0.0634	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Thallium-208	**0.252**		0.0776	0.0818		0.0299	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Thorium-228	**0.671**		0.124	0.142		0.0666	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Thorium-232	**0.924**		0.253	0.270		0.0634	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Thorium-234	-1.04	U	0.786	0.794		0.754	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Uranium-235	-0.267	U	0.410	0.411		0.612	pCi/g	10/03/18 11:44	10/24/18 19:33	1
Uranium-238	-1.04	U	0.786	0.794		0.754	pCi/g	10/03/18 11:44	10/24/18 19:33	1

Client Sample ID: PE2-RSYB6-DC-B-S002

Lab Sample ID: 160-31043-2
Date Collected: 09/13/18 13:23
Matrix: Solid
Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.478**		0.266	0.271		0.240	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Actinium-227	0.180	U	0.501	0.502		0.415	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Bismuth-212	0.540	U	1.07	1.07		0.831	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Bismuth-214	**0.751**		0.193	0.208		0.0745	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Cesium-137	-0.0758	U	0.116	0.116	0.0700	0.0823	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Cobalt-60	**0.0394**		0.0829	0.0829	0.200	0.0391	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Lead-210	**1.32**		1.16	1.17		0.743	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Lead-212	**0.738**		0.123	0.155		0.0479	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Lead-214	**0.754**		0.180	0.196		0.0800	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Potassium-40	**16.5**		2.21	2.78		0.270	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Protactinium-231	0.000	U	0.762	0.762		2.63	pCi/g	10/03/18 11:44	10/24/18 20:33	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Client Sample ID: PE2-RSYB6-DC-B-S002

Lab Sample ID: 160-31043-2
Date Collected: 09/13/18 13:23
Matrix: Solid
Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.751**		0.193	0.208	0.700	0.0745	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Radium-228	**0.478**		0.266	0.271		0.240	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Thallium-208	**0.295**		0.0872	0.0924		0.0285	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Thorium-228	**0.738**		0.123	0.155		0.0479	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Thorium-232	**0.478**		0.266	0.271		0.240	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Thorium-234	**1.05**		0.647	0.657		0.473	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Uranium-235	0.147	U	0.359	0.360		0.335	pCi/g	10/03/18 11:44	10/24/18 20:33	1
Uranium-238	**1.05**		0.647	0.657		0.473	pCi/g	10/03/18 11:44	10/24/18 20:33	1

Client Sample ID: PE2-RSYB6-DC-B-S003

Lab Sample ID: 160-31043-3
Date Collected: 09/13/18 13:30
Matrix: Solid
Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.892**		0.273	0.288		0.0792	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Actinium-227	-0.0525	U	0.161	0.161		0.472	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Bismuth-212	0.527	U	0.968	0.969		0.757	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Bismuth-214	**0.634**		0.171	0.184		0.0573	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Cesium-137	0.0153	U	0.0619	0.0619	0.0700	0.0492	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Cobalt-60	-0.0602	U	0.110	0.110	0.200	0.0629	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Lead-210	-0.266	U	1.36	1.37		1.49	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Lead-212	**0.751**		0.114	0.150		0.0495	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Lead-214	**0.685**		0.115	0.135		0.0577	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Potassium-40	**18.7**		2.07	2.82		0.242	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Protactinium-231	0.190	U	1.61	1.61		2.48	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Radium-226	**0.634**		0.171	0.184	0.700	0.0573	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Radium-228	**0.892**		0.273	0.288		0.0792	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Thallium-208	**0.255**		0.0723	0.0770		0.0257	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Thorium-228	**0.751**		0.114	0.150		0.0495	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Thorium-232	**0.892**		0.273	0.288		0.0792	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Thorium-234	**0.698**		0.643	0.647		0.531	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Uranium-235	-0.293	U	0.371	0.372		0.518	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Uranium-238	**0.698**		0.643	0.647		0.531	pCi/g	10/03/18 11:44	10/24/18 20:31	1

Client Sample ID: PE2-RSYB6-DC-B-S004

Lab Sample ID: 160-31043-4
Date Collected: 09/13/18 13:36
Matrix: Solid
Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.802**		0.200	0.216		0.0922	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Actinium-227	0.142	U	0.338	0.339		0.342	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Bismuth-212	0.293	U	0.518	0.519		0.397	pCi/g	10/03/18 11:44	10/24/18 20:32	1

Client Sample Results

Client: Aptim Federal Services LLC
TestAmerica Job ID: 160-31043-2
Project/Site: Hunters Point Naval Shipyard - Parcel E2

Client Sample ID: PE2-RSYB6-DC-B-S004
Lab Sample ID: 160-31043-4
Date Collected: 09/13/18 13:36
Matrix: Solid
Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	**0.675**		0.124	0.143		0.0356	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Cesium-137	0.0270	U	0.0486	0.0487	0.0700	0.0377	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Cobalt-60	0.0102	U	0.0178	0.0179	0.200	0.0410	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Lead-210	0.172	U	1.27	1.27		1.04	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Lead-212	**0.744**		0.101	0.139		0.0454	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Lead-214	**0.707**		0.112	0.134		0.0612	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Potassium-40	**15.8**		1.57	2.25		0.255	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Protactinium-231	-0.387	U	2.58	2.58		2.12	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Radium-226	**0.675**		0.124	0.143	0.700	0.0356	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Radium-228	**0.802**		0.200	0.216		0.0922	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Thallium-208	**0.277**		0.0613	0.0677		0.0206	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Thorium-228	**0.744**		0.101	0.139		0.0454	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Thorium-232	**0.802**		0.200	0.216		0.0922	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Thorium-234	-0.361	U	0.486	0.488		1.00	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Uranium-235	-0.186	U	0.535	0.536		0.437	pCi/g	10/03/18 11:44	10/24/18 20:32	1
Uranium-238	-0.361	U	0.486	0.488		1.00	pCi/g	10/03/18 11:44	10/24/18 20:32	1

Client Sample ID: PE2-RSYB6-DC-B-S005
Lab Sample ID: 160-31043-5
Date Collected: 09/13/18 13:42
Matrix: Solid
Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**1.02**		0.205	0.229		0.0543	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Actinium-227	-0.101	U	0.735	0.735		0.454	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Bismuth-212	0.463	U	0.929	0.930		0.728	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Bismuth-214	**0.909**		0.201	0.221		0.0721	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Cesium-137	-0.0513	U	0.104	0.104	0.0700	0.0829	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Cobalt-60	-0.0104	U	0.101	0.101	0.200	0.0497	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Lead-210	0.623	U	1.81	1.81		1.21	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Lead-212	**0.736**		0.124	0.146		0.0615	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Lead-214	**0.737**		0.144	0.162		0.0699	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Potassium-40	**17.6**		1.92	2.62		0.122	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Protactinium-231	-1.03	U	3.45	3.45		2.81	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Radium-226	**0.909**		0.201	0.221	0.700	0.0721	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Radium-228	**1.02**		0.205	0.229		0.0543	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Thallium-208	**0.258**		0.0729	0.0775		0.0265	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Thorium-228	**0.736**		0.124	0.146		0.0615	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Thorium-232	**1.02**		0.205	0.229		0.0543	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Thorium-234	-1.07	U	0.819	0.828		1.11	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Uranium-235	-0.284	U	0.427	0.428		0.624	pCi/g	10/03/18 11:44	10/24/18 20:31	1
Uranium-238	-1.07	U	0.819	0.828		1.11	pCi/g	10/03/18 11:44	10/24/18 20:31	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Client Sample ID: PE2-RSYB6-DC-B-S006

Lab Sample ID: 160-31043-6
Date Collected: 09/13/18 13:49
Matrix: Solid
Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.805**		0.167	0.186		0.0644	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Actinium-227	-0.368	U	1.07	1.08		0.391	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Bismuth-212	0.000	U	0.486	0.486		0.593	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Bismuth-214	**0.556**		0.120	0.133		0.0549	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Cesium-137	-0.0357	U	0.0664	0.0665	0.0700	0.0524	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Cobalt-60	**0.0323**		0.0398	0.0400	0.200	0.0210	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Lead-210	-0.866	U	0.955	0.960		1.50	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Lead-212	**0.704**		0.0987	0.134		0.0443	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Lead-214	**0.659**		0.114	0.133		0.0472	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Potassium-40	**16.4**		1.61	2.32		0.259	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Protactinium-231	0.000	U	0.470	0.470		2.29	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Radium-226	**0.556**		0.120	0.133	0.700	0.0549	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Radium-228	**0.805**		0.167	0.186		0.0644	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Thallium-208	**0.246**		0.0581	0.0635		0.0202	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Thorium-228	**0.704**		0.0987	0.134		0.0443	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Thorium-232	**0.805**		0.167	0.186		0.0644	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Thorium-234	**1.06**		0.491	0.504		0.314	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Uranium-235	-0.177	U	0.501	0.501		0.408	pCi/g	10/03/18 11:44	10/25/18 07:30	1
Uranium-238	**1.06**		0.491	0.504		0.314	pCi/g	10/03/18 11:44	10/25/18 07:30	1

Client Sample ID: PE2-RSYB6-DC-B-S007

Lab Sample ID: 160-31043-7
Date Collected: 09/13/18 13:56
Matrix: Solid
Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	**0.576**		0.223	0.231		0.194	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Actinium-227	0.190	U	0.495	0.495		0.430	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Bismuth-212	0.000	U	0.873	0.873		0.838	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Bismuth-214	**0.861**		0.213	0.231		0.0848	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Cesium-137	-0.0578	U	0.0975	0.0976	0.0700	0.0765	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Cobalt-60	-0.0778	U	0.142	0.142	0.200	0.0673	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Lead-210	**1.90**		1.82	1.84		1.18	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Lead-212	**0.660**		0.121	0.140		0.0610	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Lead-214	**0.827**		0.160	0.181		0.0579	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Potassium-40	**15.5**		1.84	2.41		0.127	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Protactinium-231	-0.325	U	3.41	3.41		2.80	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Radium-226	**0.861**		0.213	0.231	0.700	0.0848	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Radium-228	**0.576**		0.223	0.231		0.194	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Thallium-208	**0.318**		0.0798	0.0861		0.0274	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Thorium-228	**0.660**		0.121	0.140		0.0610	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Thorium-232	**0.576**		0.223	0.231		0.194	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Thorium-234	**0.671**		0.628	0.632		0.545	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Uranium-235	-0.285	U	0.367	0.369		0.614	pCi/g	10/03/18 11:44	10/25/18 07:31	1
Uranium-238	**0.671**		0.628	0.632		0.545	pCi/g	10/03/18 11:44	10/25/18 07:31	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-393536/14-A
Matrix: Solid
Analysis Batch: 397304

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 393536

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.1546		0.0773	0.0781	0.331	0.0517	pCi/g	10/07/18 13:14	10/25/18 07:00	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*84.2*		*40 - 110*	*10/07/18 13:14*	*10/25/18 07:00*	*1*

Lab Sample ID: LCS 160-393536/1-A
Matrix: Solid
Analysis Batch: 397293

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 393536

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits		
Total Beta Strontium			8.17	8.226		0.666	0.331	0.0650	pCi/g	101	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Sr Carrier	*87.2*		*40 - 110*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-392870/1-A
Matrix: Solid
Analysis Batch: 396905

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 392870

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	-0.02862	U	0.0944	0.0944		0.122	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Actinium-227	-0.2022	U	0.614	0.614		0.368	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Bismuth-212	-0.4717	U	0.881	0.883		0.657	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Bismuth-214	-0.09220	U	0.224	0.224		0.191	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Cesium-137	-0.006984	U	0.0687	0.0687	0.0700	0.0571	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Cobalt-60	0.04524		0.0428	0.0431	0.200	0.0218	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Lead-210	-0.6495	U	1.10	1.11		0.876	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Lead-212	-0.02311	U	0.0833	0.0833		0.0905	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Lead-214	-0.06380	U	0.107	0.107		0.0947	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Potassium-40	-0.2411	U	0.620	0.620		0.352	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Protactinium-231	0.0000	U	0.651	0.651		1.68	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Radium-226	-0.09220	U	0.224	0.224	0.700	0.191	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Radium-228	-0.02862	U	0.0944	0.0944		0.122	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Thallium-208	0.02448	U	0.0759	0.0760		0.0288	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Thorium-228	-0.02311	U	0.0833	0.0833		0.0905	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Thorium-232	-0.02862	U	0.0944	0.0944		0.122	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Thorium-234	-0.4317	U	0.764	0.766		0.650	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Uranium-235	-0.04296	U	0.0803	0.0804		0.267	pCi/g	10/03/18 11:44	10/24/18 17:38	1
Uranium-238	-0.4317	U	0.764	0.766		0.650	pCi/g	10/03/18 11:44	10/24/18 17:38	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-392870/2-A
Matrix: Solid
Analysis Batch: 396906

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 392870

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	99.48		10.5		0.654	pCi/g	103	87 - 116
Cesium-137	28.1	28.46		3.05	0.0700	0.0963	pCi/g	101	87 - 120
Cobalt-60	12.5	12.40		1.31	0.200	0.0246	pCi/g	99	87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Rad

Leach Batch: 392481

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31043-1	PE2-RSYB6-DC-B-S001	Total/NA	Solid	Dry and Grind	
160-31043-2	PE2-RSYB6-DC-B-S002	Total/NA	Solid	Dry and Grind	
160-31043-3	PE2-RSYB6-DC-B-S003	Total/NA	Solid	Dry and Grind	
160-31043-4	PE2-RSYB6-DC-B-S004	Total/NA	Solid	Dry and Grind	
160-31043-5	PE2-RSYB6-DC-B-S005	Total/NA	Solid	Dry and Grind	
160-31043-6	PE2-RSYB6-DC-B-S006	Total/NA	Solid	Dry and Grind	
160-31043-7	PE2-RSYB6-DC-B-S007	Total/NA	Solid	Dry and Grind	

Prep Batch: 392870

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31043-1	PE2-RSYB6-DC-B-S001	Total/NA	Solid	Fill_Geo-21	392481
160-31043-2	PE2-RSYB6-DC-B-S002	Total/NA	Solid	Fill_Geo-21	392481
160-31043-3	PE2-RSYB6-DC-B-S003	Total/NA	Solid	Fill_Geo-21	392481
160-31043-4	PE2-RSYB6-DC-B-S004	Total/NA	Solid	Fill_Geo-21	392481
160-31043-5	PE2-RSYB6-DC-B-S005	Total/NA	Solid	Fill_Geo-21	392481
160-31043-6	PE2-RSYB6-DC-B-S006	Total/NA	Solid	Fill_Geo-21	392481
160-31043-7	PE2-RSYB6-DC-B-S007	Total/NA	Solid	Fill_Geo-21	392481
MB 160-392870/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-392870/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 393536

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31043-1	PE2-RSYB6-DC-B-S001	Total/NA	Solid	DPS-0	392481
MB 160-393536/14-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-393536/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31043-2

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Sr Carrier (40-110)							
160-31043-1	PE2-RSYB6-DC-B-S001	87.4							
LCS 160-393536/1-A	Lab Control Sample	87.2							
MB 160-393536/14-A	Method Blank	84.2							

Tracer/Carrier Legend

Sr Carrier = Sr Carrier